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THE EARLY HISTORY OF MALARIA.

From the Pharmacological Department of the Evans Memorial, Boston.

By CONRAD WESSELHOEFT, M. D., Boston.

It may seem out of place to enter upon the historical side of this subject but as we expect to investigate our topic from many different points of view it is only fitting that we should begin with an historical foundation. Moreover, by studying the original sources and the development of our present knowledge, and by comparing what our predecessors knew and believed with what we to-day consider to be facts, we gain a better appreciation of the basis upon which our modern therapeutics rests.

When and where malaria first made its appearance is a matter of conjecture. The chances are that man has suffered with this disease from prehistoric times. Some construe the myth of Hercules and the Hydra to indicate the reclamation of marshes which were uninhabitable on account of malaria. The story of Apollo and the Python has also been interpreted to indicate a conquest of this dreaded disease. Others see references to malaria in the Iliad in the Orphic poems, and in the fifth book of

Moses or Deuteronomy.[1] These speculations are very far-fetched. I find nothing in Deuteronomy which suggests intermittent fever, and so far as the Iliad is concerned, the word **puretos,** meaning "fever" or "heat," occurs but once, and there is nothing in the line to suggest malaria except the time of year * Aristophanes, however, uses the same word in a passage which might be construed to refer to the disease in question.

Groff maintains that the ancient Egyptians suffered from malaria, as indicated by the annual recurrence of a fever which is mentioned in the inscriptions on the ruins of the temple at Denderah.

This brings us to Hippocrates, who is invariably given the credit of having been the first to describe malaria and to distinguish the different forms. In his "Epidemics," this ancient medical writer and teacher differentiates a continuous from an intermittent fever and subdivides the intermittents. He says: "Fevers are,—the continual, some of which hold during the day and have a remission at night, and others hold during the night and have a remission during the day; semitertians, tertians, quartans, quintans, septans, nonans."[2] Among the fourteen cases of fever which he describes, none is in any way a typical case of malaria. In his Aphorisms, however, he shows his familiarity with intermittents. Here he speaks of periodical paroxysms coming at the same hour, although a paroxysm is not defined by him as a chill and fever, but merely as a fever.

In the tract on The Nature of Man, written either by Hippocrates or by Polybus, his son-in-law and pupil, there is another pertinent passage concerning fevers: "Omitting those arising with evident pain, there are four types, the names of which are: continued fever, quotidian fever, tertian fever, and quartan fever." This fact is frequently quoted by writers on malaria as the work of Hippocrates, because Galen ascribes it to him. Aristotle, however, seems to have thought that it was written by Polybus.

""*Kaí te phérei pollon puretón seilosi brotoisin.*" xxii, 31.

The line refers to the dog star, which "brings much *purétos* to miserable mortals." This word is translated by "heat" or "fever," but "fever" is probably correct. In later Greek the word was certainly used in this sense, and *épialos* which perhaps originally meant nightmare, came to mean the shivers preceding a fever, i. e., ague. There is a fragment of Aristophanes (315) quoted by the Scholiast on Vespæ 1038, which suggests a malarial fever, *ama d'épialos puretoú erodromos,* which translated means "and at the same time the shiver which is the forerunner of fever." Vespæ 1038 has the same word *épialos,* perhaps in the same sense.

From all this it would appear that malaria existed in the time of Hippocrates (about 450—350 B. C.), since tertian and quartan fevers are in all probability of a malarial nature. But we are not justified in asserting (as is too often assumed) that Hippocrates differentiates malaria from other forms of intermittent fevers What Hippocrates did was to distinguish intermittent from continuous fevers, and to subdivide these intermittents according to the number of days between the paroxysms, giving us a nomenclature which still remains in use. Therefore, for all practical purposes, we may say that the history of malaria begins with the Hippocratic writings, which in themselves imply a long tradition.

Jones[4] informs us that he finds clear references to malaria in the writings of Sophocles, Aristophanes, Plato, Aristotle, Demosthenes, and the inscriptions, but he maintains that the disease did not become endemic in Attica until the close of the fifth century B. C. It is interesting to note that Hesiod, the Bœotian poet, did not mention fever as one of the farmer's plagues, although, as Jones suggests, he would probably have done so had malaria existed. Bœotia is to-day a notoriously malarial region. According to Puschmann,[5] Erasistratos, who was born about 330 B. C., mentions fevers associated with inflammation of the liver and the "useless spleen." Plutarch,[4] a native of Bœotia, who lived between 45 and 125 A. D., remarked that the poor country-folk constantly fell ill during their exertions at harvest time, and that fever was one of their great dangers; he even used the term **phrevitis,** which later denoted a pernicious type of intermittent fever.

Celli[6] gives us the most complete history of malaria in Italy. According to this author, the disease raged among the earliest inhabitants of Latium These people took the first steps in sanitary engineering along the lines of preventive medicine. Recognizing that the stagnant waters of the Campagna were a cause of ill health, they made a network of drains, which have been discovered by recent archæologists. This remarkable drainage system permitted numerous settlements in this territory to grow up and flourish. Nevertheless, the goddess "Febris" continued to be honored in the land, and this implies that fevers were prevalent. Cicero refers to the tradition that Romulus founded his city on a healthy spot in a pestilent neighborhood. The Cloaca

Maxima, which was built in the early days of Rome, must have done much to diminish the breeding places of mosquitoes. Livy remarks that the Roman soldiers, after the siege of Capua, declared that they never wanted to go back to the pestilent and barren country about that city (*"in pestilenti atque arido circa urbem loco"*). Among the many Latin writers who mention unhealthy localities, bad airs, autumnal fevers, and swollen spleens none gives us a clearer indication of the existence of typical malaria than Horace. He was very much afraid of it himself, especially in traveling, and alludes to the deadly semi-tertian, that is, probably, to what is now called pernicious or æstivo-autumnal. He speaks of the foolishness of attempting to hold out against a fit of trembling at dinner, as to do so would only lead to a disaster. We can not mistake this reference to the sudden onset of a malarial chill coming, so to speak, out of a clear sky. Celsus enters at length into the discussion of fever, and recognizes the semi-tertian. Celli cites no less than seventeen writers from Cato to Palladius who make references which indicate the existence of the disease throughout the rise and decline of the Roman Empire. Varro, Columella, Palladius, and Vitruvius suggested that the minute animals seen in the stagnant water of swamps, together with the emanations from the marshes, were the causes of intermittent fevers.[7]

Jones[4] has taken up the influence of malaria upon Greek and Roman history, especially in regard to the prolonged effects of the disease on national prosperity and national character He maintains that malaria was comparatively rare during the rise of Athens and Rome, and that it increased during the decline in both cases. Moreover, he goes on to say:—

"The change in the Greek character was just that which we should expect malaria to produce in a highly sensitive and cultivated people, while the savage brutality of the later Romans may be due to the same cause. The peculiar effects of a disease on national morality will certainly vary with the prominent national characteristics. The more effeminate Greek grew weak and inefficient; the stern Roman became viciously cruel. But it must always be carefully remembered that other factors, physical and psychological, contributed to the change in both cases. But malaria gave rise to physical conditions which afforded an excellent opportunity for other influences to produce their full effect."

This degrading influence of malaria on moral character is men-

tioned by North in his "Roman Fever." Just how much bearing it had on the fall of these two cities is difficult to determine. Whether the disease increased because of the conditions associated with the decline or vice versa must be considered. Certainly the Greeks were sufficiently effeminate, and the Romans sufficiently cruel, before their decline began. The luxury and leisure simply gave opportunity for a greater display of these national characteristics. Luxury and idleness tend to bring out the bad traits of any people, but a given toxic substance usually acts in a general direction, the exceptions usually exhibiting the opposite or no effects. That malaria does effect the mentality of the patient is not to be questioned, but the prolonged effect is to make the patient indifferent and melancholy rather than to accentuate the predominant character of the individual. However, this might lead to moral degradation, just as the hook-worm disease has brought this about among its victims in the South.

The early Hindu medical writers, Charaka and Susruta, were dominated by the Brahman religion. They recognized three types of intermittents. The quotidian was a disease of the meat, the tertian of the fat, and the quartan of the bones.[8] In an extract from the Sanscrit Susruta, written at least thirteen centuries ago, and translated by Sir Henry Blake, there is a brief enumeration of some of the prominent symptoms of malaria. These symptoms are ascribed to the bites of no less than "twelve different kinds of terrific mosquitoes, with equally terrifying Hindu names . . . Their bite is as painful as that of serpents and causes diseases resulting from the three humors joined together (wind, bile, phlegm);" "the bite, as if burnt with caustic or fire, is red, yellow, white, and pink in color, accompanied by fever, pain of the limbs, hair standing on end, pain, vomiting, diarrhea, thirst, heat, giddiness, yawning, shivering, hiccup, burning sensation, intense cold, etc."[9] The editor who quotes this extract in the *Journal of the A. M. A.* makes the appropriate remark that this "approaches some of the early Greek records of disease in fidelity to fact."

The Arab physician Rhazes (932 A. D.) mentioned intermittent fever, but, as with Galen, his writings on the subject show that he was influenced by the Hippocratic works, nor did he offer anything new. He was also familiar with the works of Charaka and Susruta.

The Chinese of about this period also mention intermittent fever. According to their school, there was a specific drug for each disease, and among the many mineral and vegetable drugs employed by them, arsenic was chosen as the specific for these cases.[8]

Throughout the Middle Ages we find little mention of intermittent fevers except what was borrowed from the ancients, although Celli cites evidence to show that the disease continued to ravage in the Campagna with varying intensity. Paracelsus, who lived in Germany between 1490 and 1541, appears to have had experience with malaria in his practice, and advocates the most grotesque and unique treatment with magic. Mercatus (Luiz de Mercado), who flourished during the last half of the 16th century as Court physician to Philip II and Philip III of Spain, wrote on the subject of intermittent fevers in terms of the humoral vagaries of his time.[7]

In 1624 Adrian Spigelius* of Brussels published an extensive treatise on "Semitertiania."[11] It is the first long work on intermittent fever, comprising four books in all. In the first, he deals with the history from Hippocrates, Celsus, and Galen down to his own time, and then enters into a discussion of the causes. The second book takes up the diagnostics, with records of several of his own cases, while the third and fourth are devoted to the treatment. In the elaborate work of this Belgian physician and scholar, who held the position of Professor of Anatomy at Padua, we see a complete reflection of the highest type of medicine in his day. Dominated by the writings of the ancients, and permeated with the extravagant notions regarding the humoral causes of disease, we find him relying on the words of the Greeks and Romans, and to all practical purposes offering nothing new either in the nature or treatment of intermittents. He discusses his own cases without exhibiting any originality, although he

*Adrian Vanden Spieghel (or Adriaan van den S.) was born in Brussels in 1578. He studied at Padua, and practiced in Belgium, later moving to Germany (Moravia). In 1605 he was appointed Professor of Anatomy and Surgery at his alma mater, being the direct successor to Vesalius. This position he held to his death, which occurred at the age of 47 in 1625. He was the first author of an extensive treatise devoted to intermittents. This was published in Frankfurt in 1624, and later included in his "Opera," edited by Van der Linden and published at Amsterdam in 1645. Spigelius was a botanist and internist as well as anatomist, although he apologizes in his introduction to this work for venturing on the domain of others. It is rather surprising that his name is omitted with such regularity by modern authors in connection with the history of malaria. (Bibliography, see Gurlt and Hirsch, Biographisches Lexicon der Hervorragenden Aerzte. Wien u. Leipzig, 1887; also Laird, A. T., **Albany Medical Annals.** Vol. XXVII. No. 10, p. 726.)

does give a clearer picture of a typical malarial paroxysm than any of the earlier medical writers. From him we learn that the disease occurred in Germany as well as in Italy.

Shortly after the death of Spigelius (1625) came the introduction of the cinchona bark into Europe (1632), and with it we have a reawakening of interest in intermittent fever. Here begins a new period in the history of malaria, but before entering into this new development, let us look back at the treatment which was in use up to this time.

Hippocrates in his Aphorisms tells us, "We should purge upward in summer and downward in winter"[3] (IV, 4)—from which we may assume that his intermittents were given hellebore,—"and that we must retrench during paroxysms, for to exhibit food would be injurious. And in all diseases having periodical paroxysms, we must restrict during paroxysms" (I, 11). Plutarch, although not a physician, shows clearly that the Hippocratic directions continued to be followed. Malaria was undoubtedly prevalent in his time, and many of the digestive disturbances of his contemporaries may have been due to manifestations of this disease. In his "Rules for the Care of the Health," we find the following: "Emetics and purges are bad. Dieting is the proper remedy for indigestion. If something must be done, vomiting is the less evil, but violent drugs must be avoided. Drinking water or fasting for a few days may be tried, or even an injection. Most people take refuge at once in strong purgatives, and suffer for it."[4]

The Romans give us much more explicit directions for treating fevers. They follow Hippocrates to a certain extent in his expectant method during the height of the paroxysm. Celsus recommended blood letting, while Galen, following Celsus in this regard, also mentions scarification, cupping, purgations, and emetics. The basis of Galen's pathology and diagnosis is the proposition that there is no functional disturbance without organic disturbance. The basis of his treatment is the use of contraries or allœopathy. Consequently, to rid the patient of the fever which raged in the veins and vitals, he attempted to cause the patient to throw it off with emetics and purgatives; and to aid in this, he employed scarification, cupping, and venæ-section. We find him recommending this last measure especially in those high fevers that occur in the spring and fall.

Just what treatment was used through the Middle Ages is uncertain. The clergy, the quacks, and the old women did more prescribing than they do to-day. There were seats of medical learning where the works of the ancients were used as text-books, but the profession was not overworked with holders of medical diplomas. Intermittent fevers were said to be due to some disturbance in the proportion of humors, yellow and black bile, phlegm and blood, which had to be rid from the system by the many drastic measures alluded to above. Mercury was the usual purge, as it is now in this disease. In those dark ages it was given to cast off vague humours; in these enlightened days it is also given "to get rid of the bile"[14] or some equally vague injurious substances which are thought to complicate malaria. But we shall come to the subject of mercury later.

Paracelsus was the first to get away from all these humoral vagaries by substituting methods of spiriting away disease. Influenced by the pharmaceutical chemistry of Valentine,* he also broke away from Galenic tradition by introducing the study of pharmaceutics into medicine. His treatment is as follows:—"If the patient, suffering with a quotidian, tertian, or quartan fever, starts to have a paroxysm, put him to bed, cover him up warm, and fill both his hands full of rye. The patient is then to hold the rye in his hands until it gets wet with sweat and until the fever is all gone, after which it is to be taken away and buried under the fence near a grain field."[10] We assume that if any of the rye was lost from the hands during the rigor, the doctor was not responsible should a cure not be effected. Anyway the patient must have had his mind taken from his symptoms to a certain extent, which is the basis of "Christian Science" and the "Emmanuel Movement."*

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*Basil Valentine, a Thuringian Monk who lived during the fifteenth century, is described by Walsch as "the last of the alchemists, the first of the chemists and the founder of pharmaceutical chemistry" (Walsch, J. J., Old Time Makers of Medicine. N. Y., 1911).

*We should not be too ready to condemn Paracelsus as a quack. Gordon 13 in his history of medicine uses the following words, "Paracelsus was probably the greatest charlatan and mountebank that ever acquired a celebrity in the profession." The question is whether he was sincere. If his cases of ague did better by holding rye in their hands than when bled, blistered and purged,—and they undoubtedly did,—he was justified in assuming that magic was more efficacious or less injurious than the Galenic methods. We should respect his observations in this respect. Control cases are a very recent development in clinical medicine. Moreover, it was natural that Paracelsus should attempt to explain his success. We must bear in mind that many explanations of our modern therapeutic successes are annually shattered by research experiments.

Various charms, such as a blessed amulet, a starved spider, chips of the gallows, etc., were employed by the laity during the sixteenth century to ward off or cure ague.[12] Physicians of rank and learning were by no means loath to employ these measures, as Galen was wont to recommend the wearing of amulets under certain conditions. In this the Galenic doctrines differed from the more rational therapeutics of Hippocrates, who placed dietetics foremost, drugs next, and excluded the supernatural and priestly element from his theory and practice.

Spigelius[11] goes into the treatment in a very thorough manner, covering all the methods advised by the ancients and including a host of the prescriptions used in his own time. He dwells on blood-letting, purgation, and emetics. "The last," he says, "are valuable in benign cases, but should be avoided in the malignant forms." The Pulvis Comitis de Harwick and other preparations of antimony were evidently favorites for internal medication. He also gives indications for the use of clysters, fomentations, and numerous cerates.

To sum up, we may say that, previous to the introduction of cinchona, patients suffering from malaria were subjected to drastic measures of treatment, which, with our present knowledge of this disease, appear to have been anything but helpful. Lucky was the sufferer from intermittent fever who fell into the hands of Paracelsus and his followers, under whose magic, nature was allowed to work unhampered by the crude dosing, bleeding, etc., employed by the learned followers of the ancients, and the advocates of humoural pathology.

REFERENCES.

1. Deaderick, W. H. A Practical Study of Malaria, Phil. 1911. p. 18-23.
2. Hippocrates. The Genuine Works of, Translated by Francis Adams. The Epidemics, Sec. III, 3. New York, 1886, Vol. 1.
3. **Idem:** Vol. II. Aphorisms, Section IV, 30.
4. Jones, W. H. S. Malaria and History. **Annals of Tropical Medicine and Parasitology.** Vol. 1, No. 4, 1908, p. 529. Malaria and Greek History. Manchester, 1909.
5. Puschmann, Th. Handbuch der Geschichte der Medizin. Edited by Neuberger and Pagel. Jena, 1902, Vol. 1, p. 296.
6. Celli, A. Die Malaria, translated by A. F. Celli, from the 4th Italian Edition. Berlin, 1913. pp. 57, 266.
7. Mannaberg, J. Die Malaria-Krankheiten, in Nothnagel's Specielle Pathologie und Therapie. Wien, 1899. Bd. I.
8. Neuburger, M. Geschichte der Medicin. Stuttgart, 1906, Bd. 1.
9. **Journal A. M. A.,** Nov. 9, 1912. p. 1733-4.
10. Paracelsus, T. Krautermann, V. Der Thuringische Theophrastus Paracelsus, Wunder-und Krauterdocter, III Ed., Leipgiz, 1730.
11. Spigelius, Adrian. Opera quæ extant omnia. Ex recensione Joh. Antonidæ van der Linden. De Semitertiana. Amsterdam, 1645.
12. Kahn, M. Vulgar Specifics and Therapic Superstitions. **Popular Science Monthly,** 1913.. Vol. 83, No. 1, p. 89.
13. Gorton, D. A. The History of Medicine. N. Y., 1910. Vol. 1, p. 209.
14. **Journal A. M. A.** October 26, 1912, p. 1573.

THE DISCOVERY OF THE CINCHONA BARK.

From the Pharmacological Department of the Evans Memorial, Boston.

By CONRAD WESSELHOEFT, M. D., Boston.

The first great epoch-making event in the history of malaria was the discovery of the medicinal value of cinchona bark, from which the alkaloid quinin is derived. This tree is indigenous to South America, where it grows in the moist soil along the slopes of the mounrain tanges all the way from Columbia to Bolivia. The original bark came from the cinchona forests[5] of the old Peruvian Empire, which, at the time of the Spanish invasion by Pizarro in 1527, extended from the river Ancasmayu north of Quito to the river Maule in the south of Chile. Thus the term "Peruvian Bark" refers rather to the ancient Empire of the Incas than to the present Republic of Peru. The discovery of the remedial virtues of this famous bark is so entangled with conflicting traditions and inconsistent evidence that I cannot refrain from a humble attempt to unravel the threads. The problem reduces itself to the question whether the natives of Peru taught the value of this remedy to the Spanish invaders, or whether the Jesuits who accompanied these ruthless conquerors found out its virtues for themselves.

The earliest record which we have concerning our subject is that contained in the Anatasis Corticis Peruviæ, written by Sebastian Badus and published in Genoa in 1663. The author of this work obtained his information from the manuscript letter of a certain Antonius Bollus, a Genuesse merchant who had visited Peru and traded with the Indians.

Unfortunately the date of Bollus' manuscript is not given, but from it we learn that the bark had been known to the Indains of South America "for a long time," but that they had always tried to keep it a secret from the Spaniards. The secret, however, gradually leaked out, but became known to only a few Europeans. One of these was the Corregidor of Loxa. The bark, however, did not become generally known until it was used in the case of the Countess of Chincon, then vice-queen of Peru. This occurred, according to Bollus, "thirty to forty years" previous to his writing the manuscript, thus placing the date roughly between 1620 and 1630. The story of the cure of the Countess

as derived from this manuscript of Bollus is briefly as follows*:—

It happened that in the city of Lima, which is the metropolis of the Peruvian kingdom, the wife of the vice-roy, who was at that time Count of Cinchon—(those are in error who say it was the Marquis of Mancera),—became ill of a tertian fever, a serious and dangerous illness in that region. The rumor of her illness, as is the case with distinguished persons, spread at once through the city and the neighborhood, and even got as far as Loxa. A Spaniard, then holding the governorship of that locality, heard of the illness of the Countess, and wrote to the vice-roy in cypher that he, the governor, had a certain remedy, which if used would most certainly free the vice-queen of her fever. The vice-roy told his wife of the message, and she at once consented (for we easily believe what we hope will benefit us). The governor was ordered to betake himself immediately to Lima. This he did, and, having been admitted to an audience, confirmed what he said in his letter, and bade the vice-queen be of good cheer and be confident of her recovery if she would but follow his advice. When these words were heard, they deliberated about taking the remedy, which she took, and wonderful to relate, got well quicker than can be told, to the surprise of everyone.

The next account of the bark occurs in an old manuscript found by Condamine in the College of Jesuits of Saint Paul at Lima, which appears to have been written in 1696 by one Don Diego Herrera. This asserts that the bark was known to the natives, and used by them as a remedy for intermitten fever.[20]

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*Footnote—The above is a somewhat abbreviated translation of the following Latin which we admit has offered certain difficulties:

Ægrotabat forte in Civitate Limensi, quæ est Metropolis Regni Peruviæ, Uxor Proregis, qui tum temporis erat Comtessa del Cinchon (falluntur qui Marchionem de Mancera fuisse dicunt) eratque moribus eius tertiana febris quæ febris in ea Regione nedum inquilina est, sed immitis, et periculi plena. Rumor huius ægritudinis (ut sit de Magnatibus) per urbem statim vulgatus ad finitima quæque loca peruasit, Loxamque usque tenuit. Fluxerint, puto, ab eo tempore, ad id temporis, triginta, vel quadraginti anni.

Præfecturam tum agebar eo loci Hispanus homo, qui de Comitissæ ægritudine certior factus, deliberanit per Litteras maritum Proregem admorere, quod postea fecit, in arcanis scribens sibi esse Remedium quod dam, quo si uti voluisset Prorex, sponsor indubius ei erat, conualituram eius uxorem, febrique onmi liberanda. Admonuit de hoc nuncio Uxorem maritus, quæ statim annuit, (ut facile credimus, quæ nobis profutura speramus) sine mora iussit acciri hominem, a quo suppelias sperabat, iussusque est ideo, ut nil tempori dato, Limam se statim conferret, quod ipse peregit; coramque admissus, quæ scriptis dixerat, verbisquoque confirmanit, rogans Proreginam, ut bono esset animo, et fidenti, certoque sciret se se conualituram esse, siquidem suo consilio stetisset. Quibus auditis, deliberatum est de sumendo Remedio; quod sumpsit, et mirum dictu, dicto citius conualuit, stupentibus omnibus."2

Condamine, a French botanist, who travelled from Quito to Loxa in 1737, and who devoted much attention to cinchona, credits the natives with the earliest knowledge of the medicinal virtues of Peruvian bark. He learned that the Indians employed the bark in the form of a watery infusion,[4] and he attributed the delay in the use of the remedy by the Spaniards to the hatred which he observed still existed among the natives.*

Joseph de Jussieu,[7] a physician, botanist and mathematician, accompanied Condamine on the journey to Loxa. He seems to have been just as much interested in the question as his companion, and to have arrived at the same conclusion through somewhat different channels. He informs us that it is certain that the Indians about Malacotas were the first to learn the virtues and efficacy of the cinchona.* Unfortunately his writings on the subject have never been published,** so that our information is derived from references to him by his fellow travellers and from a quotation of his manuscript by Weddell. In this letter Jussieu tells the story of a Jesuit who, being seized with an intermittent fever in the vicinity of Malacotas, excited the compassion of an Indian chief, who restored the health of the sufferer

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*Footnote—"I'usage du Quinquina était connu des Américains avant qu'il le fut des Espagnols; et suivant la lettre manuscrite d'Antoine Bollus—les Naturels du pays ont longtemps caché ce specifique aux Espagnols, ce qui est très croyable, vu l'antipathié qu'ils ont encore aujourd'hui pour les conquérants." de la Condamine; Histoire de l'Academie Royale des Sciences, 1738, p. 233.

The history of Peru abounds with stories of the cruelties inflicted by the Spaniards during their conquest of the Peruvian Empire. The following incident of Pizarro's invasion serves to characterize this cruelty, which was not only permitted but encouraged by the Jesuits. Moreover it accounts for the constant mention by authors of the hatred of the natives for their conquerors, which plays an important rôle in the discovery of the cinchona by the Europeans. Pizarro with his 160 followers arranged an audience with the Inca chief Atahualpa at Cajamarca. The Inca appeared on a golden chair surrounded by 8,000 attendants. Friar Vincente Valverde stepped forward presenting the chief with a bible, which he explained through an interpreter was the word of God. The Inca held the book to his ear, and then expressed his disbelief in the statement. At this the priest immediately cried, "To arms, Christians! these infidel dogs have insulted the minister of your Redeemer. The word of God is thrown under foot. Revenge! Revenge!" Whereupon the Spaniards, ready for this cue, began a slaughter of the innocent and unsuspecting natives."

Certium est qui prius notitiam virtutis et efficaciæ hujus arboris habuere fuisse Indos vici Malacatos. His, cum, ob calidum simul ac humidum et inconstantiam temperamenti ac inclementiam, febribus intermittentibus maxime essent obnoxi, remedium tam importuni morbi quæsivisse necessum fuit; et, cum, regnantibus Ingas, fuerunt Indi Botanices periti et virtutem herbarum indignatores acerrimi, facta variarum plantarum experientia, tandem Kinakina corticem ultimum ac fere unicum intermittentium febrium specificium remedium invenere. .Quotation of Jussieu's MS. in Histoire Naturelle des Quinquinas. Weddell, H. A., Paris 1849, p. 14.

**The loss of his valuable collections made during 15 years in South America caused Jussieu to go insane, in which state he returned to France in 1771. A work of Jussieu entitled "Reflexions sur deux espèces de Quinquina découvertes nouvellement aux environs de Santa Fe, dans l'Amerique Méridionale," was published in l'Histoire de la Société de Médecine, Paris, 1779, but this refers to two species of trees no longer included in the genus of cinchona. Ruiz named them Quinquino. From one of them we get the syrup of Tulu.17

by means of a decoction of cinchona bark. This remarkable cure caused the Jesuit to obtain from the Indians a large supply of the bark, which he brought with him back to his fatherland, where it came to be known as Jesuits' Powder.* Markham,[13] in referring to this episode, gives the date of the cure of the Jesuit as 1600.

Antoine de Ulloa[19] was a member of the same expedition with Condamine and Jussieu. Ulloa, however, made no personal investigation into the cinchona bark, but derived his information chiefly from his travelling companion, Jussieu. The latter, he says, was delegated to make a special study of this remedy, a mission which he carried out in all its details, including an investigation into the discovery of its febrifuge powers. Accordingly, we should lay especial stress on the opinion of Jussieu, who, as we have seen, came to the conclusion that the natives were familiar with the remedy and taught the method of employing it in intermittent fever to the Spaniards.**

The next author to give us an account of the subject was Don Hipolito Ruiz, who travelled in Peru in 1778. From the result of his inquiries he arrived at the conclusion that the Indians about Loxa knew of the virtues of the bark and employed it in intermittent fevers many years before the Spaniards conquered

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*Forte fortuna, tum unus ex societate Jesu iter habuerat per vicum Malacatos, is laboran febri intermittente, misericordia commotus Indorum dux, Cacique vocant, cognito R. P. morbo: Sine paululum, inquit, et ad sanitatem perfectam te restituam. Hoc dicto, exilit ad montem Indus, corticem dictum attulit et decoctum ipsius patri propinavit. Sanatu (misprinted senatus) et ad perfectam sanitatem restitutus Jesuita, persquisivit quod genus medicamenti applicaverat Indus. Cognito cortice, hujus non exiquam quantitatem collexit Jesuita, et, ad patriam redux, eadem ac in Peruviana regione pollere expertus est, inde notus primo fuit cortex Pulveris jesuitici nomine; deinde Pulveris cardinalitii; et, cum simul inter varia fructum et resinarum specimina, fructus arboris Quinaquina attulerat jesuita, fructum arboris fugandis febrius intermittentibus existimarunt; nec jesuita contradicere poterat, cum arborem nec viderat nec cognoverat; solummodo corticem attulerat; valeatque Quinquina in febribus fugandis non exigua virtute, Quina-Quina Kina-Kina vocarunt per antonomasiam. Itaque, cum sit Quina-Quina arbor toto genere diversa a cortice Peruviano ut videbimus, vel scribatur Kina-Kina usus receptum, ut destinguatur a Quina-Quina; aut melius, cortex febrifugus ac arbor Maurepasia ut cognoscat posteritas quantum Botanices et læta scientia illustissimo comiti de Maurepas debent."

Jussieu's MS. quoted by Weddell in Histoire Naturelle des Quinquinas, Paris, 1849, p. 15.

Sir Clements R. Markham,13 in referring to this episode gives the date of the cure of the Jesuit as 1600, but he is unable to give me the source of this date. His only reference to the subject is the above which we quote in full.

**Ulloa states that Jussieu introduced the remedy among many of the Peruvians, who although familiar with its febrifuge virtues, appeared to be afraid to use it until he had demonstrated to their satisfaction that it was not a dangerous drug.19

the country.* His version of the story of the care of the countess is the most complete on record. The following is a literal translation of the Ruiz's Spanish found in his Quinologia which was published at Madrid in 1792:—

"During my stay in Peru I heard at different times from various interested and trustworthy persons who had a very reliable tradition, that in the year 1636 an Indian of the province of Loxa told the Corregidor, then suffering from intermittents, the virtue of quinaquina. He, desirous of recovering his health, asked the Indian for the said bark, and inquired from him the method of using it; which was to make a watery infusion with a fixed arbitrary quantity, and to drink of this infusion as the Indians generally do with all their vegetable medicines. Accordingly the Corregidor did as he was instructed, and by this means he became free of the fever, and by continuing the use of the medicine he finally attained the restoration of his health. The same persons assured me in like manner that in the year 1638 the Corregidor being informed of the fact that the vice-queen of Peru was suffering from a tertian fever, he wrote to the vice-king, Count of Chinchon, and sent him a portion of the said bark, informing him of its efficacy and admirable virtue, and the method of employing the same; adding that it would almost certainly cure his wife of the tertian. The vice-roy, being of the opinion that there was nobody better than the Corregidor to administer the remedy, summoned him to Lima, and ordered him to make some experiments with it in the hospitals with other patients suffering from tertians before proceeding to treat the vicountess. Accordingly, in the presence of doctors of the hospitals, the Corregidor carried out the viceroy's orders, and in a few days all the patients who took the remedy found themselves free of their fevers. With such manifest and auspicious proofs, the viceroy determined to give it to his consort, who, desirous of a recovery, did not refuse to partake of it. The result was that in a few days she was free of the fever, and had recovered her health which she had come to despair of during the last six months."[16]

One who stands out prominently in this discussion is Alexander von Humboldt, whose wide range of knowledge and keen powers of observation lend weight to his opinion. In his *Cinchona Forests of South America*,[6] published in 1821, he expresses some doubt as to the details of the story regarding the Countess, especially as to Cannizares' obtaining his information from the Indians. Humboldt himself never saw the bark used

*"Es probable que los Indios de la Provincia de Loxa, tuvieron nociones de la virtue de la Quina ó Cascarilla, y puesto en práctica el uso contra les fiebres intermitentes muchos años antes que los Españoles conquistasen el Perû;....." Quinologia, p. 1. See also Delondre, A. and Bouchardat, A. Quinologie, Paris, 1854.

as a medicine by the natives,* except by those employed as bark peelers around Malacotas. Consequently, on the ground that primitive nations adhere with unalterable pertinacity to their customs, their food, and their nostrums, he infers that the natives of South America were not familiar with the febrifuge properties of the cinchona at the time of the Spanish invasion.

Humboldt concludes his remarks with the following timely information:—

"In Loxa there is no document to be found which can elucidate the history of the discovery of the Cinchona; an old tradition, however, is current there, that the Jesuits at the felling of the wood had distinguished, according to the custom of the country, the different kinds of trees by chewing their barks, and that on such occasions they had taken notice of the considerable bitterness of the Cinchona. There being always medical practitioners among the missionaries, it is said they had tried an infusion of the Cinchona in the tertian ague, a complaint which is very common in that part of the country."[6]

Tschudi[16] in his *Travels in Peru* (1847) observes that the inhabitants of the Peruvian forests drink an infusion of the green bark as a remedy for intermittent fever.** Spence informs us that the Cascarillas of Ecuador use the bark solely for dyeing purposes.***

Markham, the eminent historian and geographer, seems to have changed his mind more than once in regard to the discovery. In his *Memoir*[12] (1874), he gives us a version of the cure of the Countess, similar in many respects to the story told by Ruiz, but less detailed. Cannizares, he tells us, sent a parcel of the bark to Dr. Don Juan de Vega, who employed it successfully on the Countess. It is improbable, he says, that Cannizares learned of the bark from the natives, for he is "convinced that the remedy was unknown to the Indians in the time of Yncas.

*"The Indians cure themselves (of ague) by lemonades, by the oleaginous aromatic peel of the small green wild lemon, by infusions of Scoparia dulcis, and by strong coffee;" also, by "an excellent febrifuge, the fruit of a new species of Uvaris, which we have described by the name of Uvaria febrifuga." Cinchona Forests of South America, p. 22.

**"I have found it in many cases much more efficacious than the dried kind, for less than half the usual dose produces, in a short time, convalescence, and the patient is secure against returning febrile attacks." Tschudi, Travels in Peru. N. Y., 1847, p. 280.

***This information is derived from the U. S. Dispensatory, 19th Ed. Phil. 1907, not from the Mythologies of Mexico and Peru, by Lewis Spence, London, 1907, which we consulted for verification. It is interesting to note that Ulloa in his Voyage de l'Amerique meridionale (Amsterdam 1752) remarks that it is held by some that the Indians thought that the Europeans exported the bark from Peru for dyeing purposes, and that "they actually made some trials of its effects in this way."

It is mentioned neither by the Ynca Garcilasso nor by Acosta, in their lists of Indian medicines, nor is it to be found in the wallets of itinerant native doctors, whose materia medica has been handed down from father to son for centuries."[12] He then goes on to remark: "It appears, however, to have been known to the Indians around Loxa, a town in the Andes, about 230 miles south of Quito," citing as evidence the tradition we have already mentioned of the cure of the Jesuit at Malacotas in 1600 by bark given him by the Indians, and, strangely enough, the very part of the tradition which he doubts, namely, that in 1636 an Indian of Malacotas revealed the secret virtues of the bark to the Corregidor Cannizares. Thus Markham appears to reflect doubt on his own contention that the remedy was unknown to the Incas.

In *A History of Peru*,[14] published in 1892, Markham gives us a different version derived from the Jesuit Saldamando, whose *Los Antiquos Jesuitas del Peru* was published at Lima in 1882:—

"A memorable event took place under the government of this viceroy, conferring lasting benefit on the whole human race. The discovery of the febrifuge virtue of the quinine yielding Chinchona trees was due to the Jesuits. The second wife of the viceroy, Donna Francisca Henriquez de Ribera accompanied him to Peru. In 1628* she was attacked by a tertian fever. Her physician, Juan de Vega, was unable to cure her. About the same time an Indian of Uritusinga near Loxa in the government of Quito, had given some fever-curing bark to a Jesuit missionary. He sent some of it to Dr. Diego de Torres Vasquez, who was rector of the Jesuit college at Lima, and confessor to the viceroy. Torres Vasquez cured the vice-queen by administering doses of the bark. The countess left Peru in 1639, but died in Cartigina on her passage home. The remedy was long known as countess's bark, and Jesuits' bark, and Linnæus gave the name Chinchona to the genus of plants which produce it. The bark derived from Uritusinga and the forests near Loxa was for many years the only kind known to commerce, being exported from the port of Payta. It was known as crown bark. But various species of this precious tree are found throughout the eastern cordilla of the Andes for a distance of 2,000 miles. The discovery of Peruvian or Jesuits' bark conferred an inestimable blessing on the human race, and renders the Vice-royalty of the Count of Chinchon forever memorable."[14]

The Incas of Peru,[15] by Markham, published in 1910, contains an account of the Inca physicians. The author pays tribute to the medical skill of the Amautas, the name given to the caste of

*Sir Clements Markham has informed me that this date is an error. It should be, according to Saldamando, "a year after her arrival in 1629."[21]

learned men and scribes of the court. He remarks that the cinchona was certainly used locally as a febrifuge, and that the bark was known and used in the province of Loxa as Quina-quina.*

Having taken up the leading references in the order of their publication, let us now turn to a consideration of certain features of interest connected with the discovery of the remedial virtues of cinchona.

In the first place it is only fitting that we should mention two traditions current among the natives of Peru. One, reported by Condamine in 1738, was that a mountain lion suffering with an ague was seen to chew the bark and thereby effect a cure, thus directing the attention of the natives to its curative virtues. The other, reported by Lambert in 1797, was that some cinchona trees were blown over, and lay in a pool, the water of which became so bitter that none could drink it. One of the inhabitants of the neighborhood, however, being seized with a violent paroxysm of intermittent fever, was forced to quench his thirst with the water. His prompt recovery drew the attention of the Indians to the curative property of cinchona.

Secondly we can well afford to devote a little space to the famous Countess after whom the cinchona tree was named. Bollus informs us that after her notable recovery the Countess was approached by the authorities of the state and asked that she give her endorsement, and that she use her influence to make it known, in order that that medicine which had so wonderfully brought about her recovery might be of similar benefit to others suffering with that same kind of fever.[1] The Countess appears to have been willing to do this. Furthermore, so greatly did she treasure the bark that she collected a goodly supply. On her leaving Lima in 1639, she left part of this with her Jesuit advisers, and the rest she carried back to Spain in 1640, as the story goes, to distribute it there among the sick on her

*"The Amautas also had an extensive knowledge of the use of medicinal herbs and roots, and their advances in surgery are attested by the discovery of skulls at Yucay and elsewhere on which the trepanning operation had been performed. They used infusions of several herbs as purgatives and stomachics, as well as the root of a convolvulus; other herbs were used, for colds and pulmonary complaints, and salves were used, consisting of leaves and seeds of certain plants dried, pounded, and mixed with lard, some for wounds, others for rheumatism. For fevers they used several tonics, including a gentian. The chinchona plant was certainly used locally as a febrifuge, but not, I think, universally. In the Loxa province the bark was used, and known as Quina-quina. In the forests of Caravaya an infusion of the Chinchona flowers was given for ague, and called **yara chucchu.** The name **calisaya,** the species richest in quinine, is derived from two Quicha words: **Cali,** strong, and **sayay,** to stand." The Incas of Peru, Markham, C. R., p. 156-157.

lord's estate.[12] According to Markham, her charity is evidenced by local traditions in and about Cinchon* of the cures effected by the Countess' Powder (Pulvis Comtissæ), by which name the bark came to be known.[12] Whether she and her husband brought home a very large amount, or whether there were few cases of fever about Chinchon, or whether the Spaniards refused to take the drug, the fact is clear, according to a publication of Sir George Baker[3] in 1785, that a considerable quantity of the substance remained in the hands of the family many years after the Count and Countess were dead.**

Condamine informs us that Dr. Don Juan de Vega, physician to the Countess, followed his patient to Spain a short time later, bringing with him a supply of the bark, which he sold at Seville for 100 reals a pound.

An interesting point comes up here in regard to the spelling of cinchona. Condamine, who was the first naturalist to describe the tree, sent specimens to Linnæus, the great Swedish botanist. Linnæus wished to name the tree after the famous Countess, but he mistook the spelling of her title. Thus he gave the name Cinchona, Quinquina Condamin, to this new species, which appears for the first time in his *Genera Plantarum,* published in 1742. Markham, in his "Memoir of the Lady Ana de Osorio, Countess of Chincon and Vice-queen of Peru," suggests that Linnæus strove to correct this mistake only to fall into a graver error, because in the edition published in 1767 at Vienna, the name reads "Cinhona, Quinquina Condamin." This must have been the fault of the printer, as we find the old spelling Cinchona on page 69, and in the index of this same edition. Had Linnæus attempted to correct his original error he undoubtedly would have changed the original spelling on page 69 and in the index,—the only other two places where the name is used. We are inclined to trace this mistake to the earliest publication on cinchona which we have, namely, that of Sebastian Badus where he refers to the lady as the "Comtessa del Cinchon." In his *Memoir,* Markham makes the following fervid plea for the correction of Linnæus's error:—

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*The Castle of Chinchon lies near Madrid.

**The story of the cure of the Countess has been made the basis of a poem by Walekenaer in his "Vie de la Fontaine," and it also serves as a background for a novel, "Zuma," written by Madame de Genlis. The latter has disregarded both tradition and fact for the sake of fiction.

"I plead for the correct spelling, as tribute of respect to a great historical family, now passed away; as a right which may justly be claimed by the people of Chinchon; and as the only way by which the memory may be preserved of her who made known to the world the inestimable value of quinquina bark, who was thus a benefactor to mankind, but whose monument has been destroyed, whose place knows her descendants no more, the illustrious and beautiful lady, Ana de Osorio, fourth Countess of Cinchon."*

Though the Countess of Chinchon has generally had the credit of introducing the bark into Europe, there seems to be some doubt as to whether she ever returned from Peru to Spain. Indeed, her very identity is in dispute. We have seen that Sir Clements R. Markham, in 1874, declared that the person meant was the beautiful Ana de Osorio, but that more recently (in 1892) he follows Saldamando and identifies the Countess with Dona Francisca Henriquez de Ribera, who died at Cartagina** on her way to Spain, in 1639. Linnæus's original spelling has remained in botanical and pharmacological literature up to the present day, and its acceptance by the Council of Ghent gives it the stamp of final authority. The family of Chinchon has long been extinct, and to attempt a change at this date would only cause trouble and confusion. Moreover, it appears from evidence presented in this and the following chapter, that the Countess, whoever she may have been, was by no means the first to "make known to the world the inestimable value of quinquina bark," if, indeed, she had much of anything to do with the matter.

Now that we have passed in review all the evidence available, let us see if it throws any light on the discovery of the most reliable and one of the most valuable drugs in medicine.

In the first place, we have the legends of the natives, which reflect credit on the intuitive powers of these primitive peoples of South America, and make no mention of Europeans. It is, of course, possible that such traditions could have come into existence even though the Spaniards introduced the bark as a remedy among the natives; but it is at least improbable.

In the second place, we have two traditions; one regarding the cure of a Jesuit at Malacotas in 1600 by bark given him by

*Lady Ana de Osorio, widow of the Marquis of Salinas, married in 1621 Don Luis Geronimo Fernandez de Cabrera y Bobadilla, fourth Count of Chinchon, viceroy of Peru from 1629 to 1639.

**Cartagina is a flourishing city in the present Republic of Columbia.

a native—the earliest cure of a white man mentioned;—the other of the cure of the Corregidor Cannizares, who also obtained the bark from an Indian of Malacotas. Then we have the statement by Humboldt[6] that only the Indians about Malacotas had any confidence in the curative value of cinchona bark. Humboldt considers that the bark-peelers of Malacotas learned the virtues of the bark from their white employers. It is rather striking that the native bark-peelers of Loxa and Guanccabamba had no confidence in this remedy at the time of Humboldt's expedition and would die rather than have recourse to it.[6] As emphasized by this scientist, primitive peoples adhere with great pertinacity to their traditions; yet it must also be remembered that neighboring tribes often have quite different customs and nostrums. Consequently, we cannot but be impressed by the relation of these two traditions to the observation of Humboldt. This relation suggests the possibility that the Indians about Malacatos were the only ones who ever knew of this remedy, and that they alone, therefore, handed down the traditions of its usefulness.

In the third place, the earlier travelers and scientists who have written on Peru voice the opinion that the remedial virtues of cinchona in intermittent fevers were known to the natives at the time of the Spanish invasion. The earliest mention of our subject is made by a Genoese merchant, Antonius Bollus, who traded in Peru, and whose manuscript letter is referred to in the Anastasis Corticis Peruviæ of Sebastian Badus, published in Genoa in 1663. According to this letter, the natives of Peru kept the remedy a secret from the Spaniards for many years; thus implying that the Indians were the original discoverers of its virtues, and that they later imparted their knowledge to the Spaniards. Condamine, Jussieu, and Ruiz studied the subject during their stay in Peru, and all found sufficient evidence to convince them that the Indians were the original discoverers of the value of the bark as a febrifuge. Humboldt alone stands as the consistent champion for the theory that the bark was unknown to the Peruvians at the time of the Spanish invasion, basing his argument on his own observation that the bark was not generally used as a febrifuge by the natives at the time of his expedition. We have already discussed the significance of the fact that the bark was used locally about Malacotas, and

we need only add that other travelers have seen the Indians employing various infusions of cinchona in intermittent fevers, and that Markham is of the opinion that the febrifuge powers of the bark were known to the Incas about Loxa.

In the fourth place, the etymology of the names of the cinchona among the Indians is more than suggestive of the natives' valuation of this remedy. Jussieu informs us that they call it *yara-chucchu,* or cava-chucchu, *yara* meaning tree, *cava* meaning bark and *chucchu* being their word for intermittent fever. Thus they called the cinchona the intermittent fever tree, and its bark the intermittent fever bark.* As to the derivation of the term quina-quina, the word *quina-ai,* according to Condamine, designated a kind of cloak or covering of the Indians, and was applied metaphorically to the bark of a tree. The repetition ot the word in quina-quina serves as a superlative, thus implying a very special bark or the best of bark.**

Finally, a word as to the probability of the Jesuits being the original discoverers of the remedy. The tradition recorded by Humboldt to the effect that the Jesuits were in the habit of chewing the barks at the felling of the trees, and were thus attracted to the bitterness of the cinchona, and that as a result they tried it as a remedy in ague, is almost as great a feat of imagination as the tradition regarding the mountain lion. In the first place, many of the barks of South American trees are intensely bitter; secondly, the act of "chewing" some of these barks is sufficient to produce considerable discomfort, more especially the cinchona bark, and anyone who did much chewing (which we are told was their way of tasting the bark in the forest), would probably give up the habit of chewing barks or he would give up the habit of felling trees altogether. Thirdly, the idea that these Jesuits should experiment with this bark in the numerous fevers which occur about Loxa and so promptly arrive at the conclusion that its efficacy lay in cases of ague is granting too much sagacity to the members of that ecclesiastical order who were wise enough to recognize a good thing when it was pointed

*"Nec alio nomine apud illos arbor nota quam ab effectu. Vorarunt yarachucchu, cava-chucchu. Yara idem est ac arbor; cava idem est ac cortex; chucchu: horripilatio, frigus, febris horripilatio; quasi diceres arbor febrium intermittentium." Joseph de Jussieu. MS. quoted by Weddell.

**I am informed by Sir Clements Markham that this reduplication is used in all medicinal barks.

out to them, and to introduce the same into Europe. It is indeed worthy of note that Jussieu, Condamine, and Ruiz did not hear of this tradition, in spite of the fact that they made very special inquiries into the traditions connected with the discovery. Moreover, it is our opinion that, had the Jesuits discovered the remedy for themselves, they, being the scribes, would most certainly have given themselves the credit; and this religious order would have honored the man who made the discovery by handing down his name to posterity, to say nothing of making him a saint. The only name of a Jesuit mentioned in regard to the discovery is that of Torres Vasquez, of Lima, who, we are told, obtained the bark from the natives.

We may state in conclusion that the circumstantial evidence from which we must judge favors the theory that the Indians about Malacatos were the first to discover the value of the cinchona bark in malaria, and that owing to the cruel methods employed in the subjection of the Peruvians they did not impart their knowledge of this invaluable remedy to the Spaniards until the beginning of the seventeenth century.

REFERENCES

1. Delongre, A. and Bouchardat, A.—Quinologie, Paris, 1854, see map.
2. Badus, Sebastian, Anastasis Corticis Peruviæ, seu Chinæ Chinæ defensio. Genoa, 1663, p. 16, 22, 23.
3. Weddell, Hugh Algernon. Histoire Naturelle des Quinquinas. Paris, 1849. pp. 1, 2 and 15.
4. Condamine, C. M. de la, Sur l'arbre du Quinquina. Histoire de l'Academie Royale des Sciences, 1738, p. 226.
5. Hutchinson, Thomas J., Two Years in Peru. London, 1873, Vol. II, pp. 179, 182.
6. Jussieu, Joseph de—Ms quoted by Weddell in Histoire Naturelle des Quinquina. S, Paris, 1849, p. 15.
7. Weddell, Hugh Algernon. Histoire Naturelle des Quinquinas. Paris, 1849. Pp. 1, 2 and 15.
8. Ulloa, don Antoine de, Voyage historique de l'Amerique Meridionale. Amsterdam and Leipzig, 1752, pp. 275, 276.
9. Ruiz, don Hipolito,—Quinologia, Madrid, 1792, p. 2.
10. Ruiz, don Hipolito,—Description of the Tree Quinquino. In an illustration of the Genus Cinchona, edited by Lambert, A. B. London, 1821, p. 94.
11. Humboldt, Alexander von,—The Cinchona Forests of South America, in an Illustration of the Genus Cinchona, edited by Lambert, A. B. London, 1821, pp. 20, 21.
12. Tschudi, Joham Jacob von., Travels in Peru. New York, 1847. pp. 279, 280.
13. Markham, Sir Clements R., A Memoir of the Lady Ana de Osorio, Countess of Chinchon. London, 1874. pp. 40, 41 and 73-74.
14. Markham, Sir Clements R., Chinchona or Peruvian Bark, London, 1880, p. 6.
15. Markham, Sir Clements R., A History of Peru. Chicago, 1892, p. 176.
16. Markham, Sir Clements R., The Incas of Peru. New York, 1910, p. 157.
17. Saldamando, Enrique Torris, Los Antiguos Jesuitas del Peru. Lima, 1882. p. 181.
18. Lambert, Alymer Bourke. A Description of the Genus Cinchona. London 1797. pp. 39, 40.
19. Baker, Sir George, Observations on the late intermittent fevers; to which is added a short history of the Peruvian Bark. Transactions of the College of Physicians, London, 1785, Vol. III, p. 175.
20. Linnæus, Carolus, Genera Plantarum. Batavia, 1742, p. 527.
21. Linnæus, Carolus, Genera Plantarum. Vienna, 1767. pp. 69 and 91.

THE INTRODUCTION AND EARLY USE OF CINCHONA BARK.

From the Pharmacological Department of the Evans Memorial, Boston.

By CONRAD WESSELHOEFT, M. D., Boston.

The date commonly assigned to the introduction of cinchona bark into Europe is that of the return of the Count and Countess of Chinchon from South America in 1640. It appears, however, from a letter written in 1663 by a Spanish physician, D. Joseph Villerobel,[1a] that this bark was first brought to Spain in 1632, and that it was administered with success to a certain ecclesiastic of Alcala in the year 1639. The veracity of Villerobel would seem to be borne out by the traditions,—already referred to,—that a Jesuit was cured of a fever by means of the bark at Malacotas, in South America, in 1600.[2] It might be argued that de Vega could only have obtained the high price he did at Seville if the therapeutic virtues of the bark had been known by previous experience with it in that country. This is suggested by the proximity of Seville to Alcala.

Like all discoveries in the field of medicine, the Peruvian bark was coldly received by the profession at large. Coming as it did from so distant a part of the world, and imported by the laity and clergy as a "cure," it is not surprising that the learned should have sneered at this exotic drug. The dawn of clinical research in therapeutics was still far distant. The medical profession clung to the doctrines of the ancients, venturing upon new methods only when they originated from their own ranks. Consequently when this new remedy gained a reputation for its febrifuge properties, the enemies of novelty promptly sought passages among the ancient authors to confirm and encourage their opposition; while those who ventured to patronize it likewise scanned their volumes of classics for some Greek quotation which could be construed as evidence in their favor.

The coldness with which the bark was received by the Spanish physicians, however, was counteracted by the zealous activity displayed in its behalf by the Jesuits. This religious order received shipments from their brethren in South America, supported and extolled its virtues with all the weight of their powerful influence, and dispensed it at no small pecuniary profit to their institutions.[3] In 1643 John de Lugo, a Spanish Jesuit, was

promoted to the rank of Cardinal. Through the diligence of this dignitary, Pope Innocent X was persuaded to order an investigation relative to the harmlessness and curative virtues of the new drug. As a result of this inquiry,—the credit of which belongs undeniably to the Jesuit Order,—the Pope's first physician reported that the bark was "both innocent and salutary." With such a recommendation from the highest medical authority, all opposition from the profession ceased in the domain of the pontiff, and Rome became the emporium for cinchona. In 1650 the Father Provincial of the Jesuits returned from South America with a large supply, which he dealt out to his brethren at a convention held in Rome. These returned with their parcels of the febrifuge to dispense it in their respective countries.

The Jesuits' Powder (Pulvis Jesuiticus, Pulvis Patrum or Pulvis Cardinalis) was not long to enjoy such favor, for it so happened that in 1652, the well-known Leopold, Archduke of Austria and Governor of the Low Countries, fell ill of a "double quartan fever," for which the bark was administered according to the Schedula Romana.* This important personage seems to have experienced relief for over thirty days, at the end of which time he suffered a relapse, which so disappointed him that he directed his physician, Chiefletius, to report the case with the idea of discouraging the use of the drug. Chiefletius cheerfully acquiesced, publishing his book in 1653. He attacks the extolled virtues of this remedy by weight of argument and experience; maintaining that it had proved a failure in Brussels, and that in Naples, Florence, Madrid, Vienna, and Paris complaints as to its inefficacy and even deleterious effects were being made. The medical profession seems to have welcomed this work with a sense of relief. It was reprinted in Paris where it met with a cordial reception.

Strangely enough, the answer to Chiefletius was not to be made by the famous doctors of the prelate's court. Cardinal de Lugo saw fit, for some reason, to entrust this task to Fabra, a French Jesuit and philosophical writer. Under the assumed name of Antimus Conygius this author affirmed that, in the year 1653,

*The Schedula Romana was to give two drachms of the finely powdered bark just before or at the beginning of the paroxysm. It also suggests infusions with wine or water, and giving the powder in the form of a bolus. It contains general rules of dosage according to the age and individual case. Torti, Therap. Specialis. 1712, p. 4; Werlhof. Observationes de Febribus præcipue intermittentibus. 1764, p. 88; Baker, Trans. College of Phys., Vol. III, 1785, p. 152.

thousands of patients had been cured in Rome by means of the Jesuits' Powder, adding much in the way of speculation to explain its virtues.[1b]

A vicious reply to the Jesuit Fabra was published by Vopiscus Fortunatus Plempius, Professor of Physic at Lovain, under the name of Melippus Protimus. The efforts of this author against the bark were the results of prejudice and malice, in contradistinction to the more temperate hostility of Chiefletius. Plempius committed a further error in judgment by openly attacking Harvey's discovery of the circulation of the blood.

This controversy* brought the bark into such disfavor among the medical profession and the laity that its use was chiefly confined to the papal domain. On the other hand, we now begin to hear of a scarcity of the drug. The Jesuits appear to have had a monopoly of the supply, and their price was such that it was deemed a suitable gift for princes. In 1650 it was said to be sold in France "weight for weight at the price of gold." In 1658 twenty doses were sold at Brussels for sixty florins.[4] Even at Rome we find Cardinal de Lugo, himself, in a letter to Badus, complaining of its scarcity and the danger of adulteration. Sturmius, who practiced in Antwerp and was one of the few advocates of this remedy, had a patient who was seized with an obstinate intermittent fever in February, 1658. It was not until the end of the following June that he could procure the bark. Three years later he published his Febrifugi Peruviani Vindiciæ. Bartholin, of Copenhagen, reports, in 1661, that he employed three doses, given him by a friend returning from Italy in a case of quartan fever with little benefit.

In England the introduction of cinchona was rather more gradual than in Spain and Italy, nor do we find any such violent opposition to it on the part of the medical profession. According to Sydenham, the bark came into vogue about the year 1655, but soon fell into disrepute owing to its inefficacy in preventing a relapse, and also because of some fatalities which followed its administration immediately before the paroxysm. One of these

*For writings on this controversy see: Cortex Peruviæ Redivivus (profligator febrium, assertus ab impugnationibus Melippi Protimi, Medici Belgæ) a Sebastiano Baldo, Medico Genuense, Genuæ, 1656; Anastasis Corticis Peruviæ, seu Chinæ Chinæ defensio, Sebastiani Badi Genuensis, Genuæ 1663). (These two works are by the same author, whose name is spelled so differently. In the copy of the latter which I consulted at the British Museum the spelling Badi has been written in above the printed Bado. The preface is signed Badus, Genuæ Dec. 1, 1663); Torti; 9 Mautt De Cortice Peruviano, Roterodam, 1760; Baker, p. 174.3

victims is thought to have been an alderman of London, who died in 1658. An epidemic of remittent fever occurred throughout England in this year, and the bark suffered in its reputation because it failed to be of benefit. Oliver Cromwell "died of a sickness of fourteen days, which had appeared an ague in the beginning."[3] The bark was not administered, so it seems, because of certain recent fatalities following its use, although Morton asserts that the failure to use it in this case was due to the fact that it was not yet approved of. This testimony is not in keeping with the fact that in 1658 the "Fever bark, commonly called the Jesuits' Powder," was advertised in a periodical newspaper* of London with the approbation of Dr. Prujean, who had held the position of President of the College of Physicians for no less than five successive years. Willis, in the second edition of his "De Fermentatione et de Febribus" (published in 1660), observes that this remedy suspends the paroxysms, but does not subdue the fever. Consequently, when Morton states that cinchona was introduced into medical practice in 1665, we are forced to doubt his accuracy. Moreover, in a letter to Sydenham, dated 1679, Brady, who was Professor of Physic at Cambridge, writes that he had used the bark successfully for about twenty years.[3]

Sydenham took up the bark very cautiously. He was at first inclined to be prejudiced against its use, but influenced by the reports of his contemporaries and his own successful administration of the remedy, he gradually came to be its ardent supporter, although he never relied on it alone in cases of ague,—with the exception of quartans. He seriously objected to the use of the bark during the paroxysm, insisting that to do so too hastily checked the fermentation of the blood, and thus was a source of imminent danger to the patient. At the same time, he emphasized the importance of interrupting the regular process of the paroxysm in tertian fevers by simultaneously purging and sweating. On the other hand, he instituted the procedure of taking two drachms daily during the intermission, which he later modified to two scruples every fourth hour. He was thus the first to advocate the fractional dosage of cinchona, a method which, in the case of quinin, is now being employed by the fore-

*"Mercurius Politicus, comprising the sum of foreign intellgence with the affairs now on foot in the three nations, for the information of the people. From Thursday, December 9 to Thursday, December 16, 1658," quoted by Sir George Baker. Transactions, College of Physicians, London, 1785, Vol. 3, p. 190.

most authorities on malaria in contradistinction to the single large doses given just previous to the paroxysm.

In order to appreciate the medical thought of this great writer and observer, the following quotation is given from his works:—

"And first, that we may at least make some conjecture about the nature and genus of agues, it is to be observed that these three seasons are to be considered in the fits; first, the time of shaking; secondly, of Ebulition; thirdly, of Despumation. To speak briefly of these things, I suppose it proceeds hence, viz: because the febrile matter, not as yet turgent, was in some sort assimilated by the mass of blood; and being at length not only useless, but become an enemy to nature, does in a manner exagitate and provoke it; whence it comes to pass that being stirred up by a certain natural sense, and as it were endeavoring to escape, it causes a shivering and shaking in the body, a true witness of its aversion, just as purging potions taken by squeamish persons, or poisons casually taken, use presently to cause a shivering, and other symptoms of that kind."

"All agues begin with shivering and shaking, and are presently succeeded by heat, and then sweat; the sick most commonly vomits both in the cold and hot fit, is very sick, dry and thirsty, and his tongue is very dry, and the like; all which symptoms retreat by degrees, as the sweat comes on; and when it is very plentiful, the fit seems to be at an end, and he that was just now sick seems to be very well, till the fit returns at its wonted time, viz., a Quotidian once every natural day, a Tertian every other day, a Quartan every third day, reckoning from the beginning of one fit to the beginning of the next, though often the last two are doubled; so that a tertian invades daily, the Quartan two whole days, the third being free from a fit; and sometimes also it comes for three days together, when it is a triple Quartan, the ague taking its name from the shape it first assumed, which doubling of the fits sometimes proceeds from the excess and too great activity of the febrile matter, in which case the adventitious fit comes before the first, sometimes also from the loss of strength, the patient being much weakened, and the vigor of the fit broken, either by cooling too much, or by evacuation above measure."

"For in the winter time the spirits are concentrated, and in their recess gather strength, which being now brisk, the heat of the approaching sun draws out, and being mixed with the viscid humours, (yet they are not so viscid as those in the fall, the heat foregoing as torrefied), which nature during winter had heaped up in the mass of blood, while they endeavor to fly away, are, as it were, entangled, and so cause the vernal ebulition, as vessels full of beer kept long in a cold cellar; if they are set near the fire, presently begin to work, and the liquor is apt to fly."[5]

Morton followed Sydenham as the most eminent supporter of the Peruvian bark. In his Pyretologia,[6] published in 1692, he

takes an extreme position, asserting that during twenty-five years he had employed this antidote in every season of the year; that, with three exceptions, it had never failed to accomplish a speedy and permanent cure in all forms of intermittents; and that the only mischief he had seen it produce was a temporary deafness. His method was to give one drachm every three or four hours during the interval, "because at that time it may be taken without exciting nausea, and is more certainly retained; and that the virtue of the antidote is conveyed into the body entire, and with great advantage, whilst the poison lies dormant and inactive."[6]

Lister, a contemporary of Sydenham and Morton, did not approve of the way in which these two physicians advocated this nostrum of a quack. The quack referred to was no less a person than Robert Talbor, alias Tabor. Sydenham indirectly condemns this man for concealing his specific for intermittents, while Morton refers to him in the most contemptuous terms.

Talbor[3] learned an effectual method of administering the bark while serving as apprentice to an apothecary. He entered St. John's College at Cambridge in 1663, where he seems to have had but a short stay. He then set himself up in Essex, where he gained a reputation for curing agues. A few years later he removed to London, where, by his success in these cases, he won the favor of Charles II. On May 2, 1678, by order of his majesty, Arlington commanded the College of Physicians "that you should not give him (Talbor) any molestation or disturbance in his practice," and had him sworn one of his court physicians.[3] It is interesting to note that Sydeham was prejudiced against the bark in 1668, and that it was not until 1680 that he arrived at his most effectual method of giving it. Talbor published a book, entitled "Pyretologia," in which he surreptitiously cautions his reader "to beware of all palliative cures, especially of that known by the name of Jesuits' Powder, as it is given by unskillful hands," adding, nevertheless, "yet is this a noble and safe medicine, if rightly prepared, and administered by a skillful hand."[3] Toward the close of his career he spent the greater part of his time in France. Here his practice was no longer confined to fevers. Persons of the highest rank, including members of the royal household, employed him. Finally, Louis XIV is said to have paid him 48,000 pounds for the secret, and published it for the benefit of his subjects after Talbor's death, which oc-

curred in 1681. This nostrum vender had been raised to knighthood, had served as physician to the courts of England and France, and had a monument erected to his memory in Trinity Church, Cambridge. The secret proved to be an infusion of the Peruvian bark with some aromatics in red wine to be administered during the paroxysm.[3] He is also said to have combined the bark with opium.[7]

Gideon Harvey is another important personage of this period. Although a doctor of medicine and a practicing physician, he outranks Moliere and Bernard Shaw as a satirist on the medical profession. In his Conclave of Physicians,[8] published in 1686, he displays a profound contempt for the commercial doctor, the anatomist, and the theory and practice of the eminent men in the profession. Harvey was not a very learned man, and he was certainly much given to advertising himself. On a question of pure medical theory his evidence might well be discredited. For the present investigation, however, he is not without significance, for he had no ascertainable reason to misrepresent contemporary conditions, as to which alone he is here cited as witness. He informs us that the virtues of the Peruvian bark in quartans had been known for over a hundred years, and that it was revived by a "debauch'd apothecaries apprentice of Cambridge, in application to all intermittent fevers."

Harvey himself evidently held a rather poor opinion of the bark, maintaining that many a patient had been "Jesuited to an early grave." He accuses the Jesuit Order of keeping the source of the "chinchina bark" secret, with the result that no one could obtain it except from their supply. According to him, it was dispensed at a crown an ounce, and the parcels sold on the market differed from one another in color, taste, weight, resin, etc., "by which men of art have been frustrated in their cure of agues."

His remarks regarding its use and abuse are not without interest. "The decoction, or infusion of the bark, doth manifestly heat any that shall take it in the state of health." He asserts that it is not only useless, but deleterious in continued fevers, and that it is indicated only in intermittents. The ague fit being due to "an high ebulition or fermentation," the bark acts as a "specific styptic," as well as by its purgative qualities. The dangers of its use in agues lie in the too sudden suppression of the

fits; consequently he recommends that small doses be given often, that it be discontinued a day or two after the fits cease, that after three weeks a few small doses be taken, and again after six weeks. Although Harvey professes to be able to get along well enough without the bark in cases of ague, it is significant that he should have found it most useful in divided doses, and also that his observations regarding its specificity in agues, its effects on the healthy body, and its variable qualities in commerce precede similar observations from more distinguished writers of a later date.*

The interest in malaria and cinchona at this time was by no means confined to England. In 1712, Torti,[9] an Italian, published an extensive treatise on fevers, in which he lays especial emphasis on the value of "china chinæ" in intermittents. This author practiced in Modena, where he seems to have gained a wide experience with the simple and pernicious forms of malaria, though Celli informs us that to-day this city is comparatively free from the disease. Torti takes up the history of intermittents, and the introduction of the Peruvian bark with the arguments raised for and against it, and he finally classifies the fevers into two main groups; namely, those which do and those which do not yield to the bark. According to him, all fevers benefited by cinchona come under the head of intermittents. Although he takes up the various diseases in which the bark was used by his predecessors and his contemporaries, he maintains that it can be relied on only in intermittents. "Nothing," he says, "is better known at our time in medicine, nothing more certain, than that china china dispels intermittent fevers."* If we substitute quinin for china china and malaria for intermittent fever, we must confess that the words of Torti, written two hundred years ago, apply to the present status of medicine as well as they did to that of his time.

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*The specificity of the bark, in intermittents was noted by Lancisi; the relative dfference between the specimens of Peruvian bark was brought out by Saunders; the sense of internal heat produced by taking the bark in a state of health was emphasized by Hahnemann; the superior efficacy of fractional dosage has been established by Nocht. It is interesting that Harvey should have given the bark after an interval of three weeks, because we now recognize that relapses are apt to occur in about three weeks following a quinin cure, a fact which will be explained when we come to the morphology of the malarial parasite.

"Ab eo autem tempore coepit adeo clarescere in dies hujusce fama Febrifugi, ut jam nostro ævo nil notius sit in Medicina, nil certius quam Febres Intermittentes China China depelli."** Francisci Torti, Therapeutice specialis. Mutinæ, 1712, Lib. I, Cap. I, p. 5. (Torti lived from 1658 to 1741).

Torti quotes from a letter of Lancisi's in which the latter remarks that in Rome, in the year 1695, the bark proved to be a specific antidote to an epidemic fever caused by stagnant waters. In 1717, Lancisi published his famous work in which he distinguished malaria from other fevers by its etiology.** His observations left him to infer that the common epidemic fevers about Rome were due to the emanations from swamps and marshes, hence the terms "paludism" and "malaria." He even went so far as to suggest that insects such as mosquitoes might be responsible.

There are many other works on intermittent fevers written during the eighteenth century, but in none of them is there anything new. Senac, Medicus, Werlhof,[10] and Stork[11] discussed the pathology and symptomatology. Huxham, Pringle,[12] Van Hoven, Home, Alibert,[13] Santorini, Albertini, Lind, and Cullen[14 15] took up the etiology and treatment.

In regard to the time of administration of the bark and the dosage, we find the same divergence of opinion that exists to-day. The reasons for this divergence, moreover, were due to the same causes which influence modern medical thought, namely, different conceptions as to the nature of the disease and the modus operandi of the drug, and different clinical observations on the part of individual physicians. Thus Sydenham based his treatment on the idea that the cathartic property of cinchona removed the "turgent febrile matter." Torti[9] was not satisfied with this explanation, as he noticed that other cathartics did not have this specific curative power in intermittents, nor did the bark neessarily have to produce catharsis to effect a cure. From his large experience he concluded that small doses given a considerable time before the paroxysm acted with better effect than larger doses given just before the paroxysm, although he admitted that the latter method sometimes produced good results. His method was to give two drachms just after the fever subsided, then one drachm the following day, to be followed by a drachm every other day during the second week.

Home gave the bark in one series of cases just before the paroxysm, and in another just after it. He found that the bark "was never more certain in its operation than when it is admin-

**Lancisi, Joannes Maria (1654-1720). Denoxiis paludum effluviis, eorumque remediis, Rome, 1717.

istered immediately after the close of one paroxysm, or forty hours before the commencement of the succeeding one."[13] Alibert preferred this method, remarking that "the success of the bark depends less on its quantity than on the manner in which it is exhibited."[13] Lind advocated giving opium during the paroxysms, to be followed by a dose of the bark when the fever had subsided. Saunders, who seems to have had admirable success with the red bark, uses the following words:—"It is seldom I have found it necessary to give more than half a dram every two hours in the interval of the fit, and in no one intermittent, even of a Quartan type, have I found it necessary to give more than six drams between the paroxysms."[4] Withering, in a letter to the last named author, remarks that he never had occasion to give more than thirty or forty grains every four hours between the fits.[4]

Werlhof[10] noticed that relapses usually took place after three weeks in tertians and after four weeks in quartans. From this observation he suggested renewing the administration of the bark at the time of the expected relapse. Alibert[13] confirmed Werlhof's observations, but he suggested that as the bark acted as a prophylactic, it should be given one week before the expected relapse.

We cannot go into all the various theories as to the modus operandi of the bark which were propounded during the eighteenth century, but it will be of interest to note the general trend of thought. We have seen that Torti criticized the speculations of Sydenham regarding the cathartic properties of cinchona. Brown[13] maintained that the bark acted as a stimulant or general tonic. Saunders remarks that "it seems more reasonable to refer its action, as an antiseptic, to its tonic power on the moving system, than to any primary action on the animal fluids."[4] Alibert takes exception to the hypothesis that cinchona cures intermittents by its antispasmodic action, on the ground that the more reliable antispasmodics showed no curative powers in these cases. Albertini advanced the explanation that the bark worked by exciting definite critical evacuations either through the sweat, stool or urine, which differed from the crises produced by other drugs in this disease.[13] A few words from Cullen's Lectures on Materia Medica, published in 1773, will show how little progress was made in the theory and practice pertaining to

our subject since the time of Sydenham. We must not confuse the term antiseptic as used by Cullen with the bactericidal meaning which it conveys to-day.

"I am very ready to allow with Dr. Pringle that a putrescency accompanies Autumnal Intermittents, and that the bark is noted for its antiseptic quality. But the small quantity given, and still more, the very small quantity extracted, and the little that must be absorbed of that quantity extracted, to me would seem to have very little effect in preventing the putrescency of the fluid. Much more do I imagine (and Dr. Pringle consents to it, and enumerates other astringents which have the same property) that the bark, in such cases, acts by restoring tone to the fibres, debilitated by the putrefaction."[14]

Hence its usefulness in all putrid fevers, continued or otherwise, and in "putrid diatheses," although he considered it of greatest value when distinct remissions occurred. His practise in intermittents was to give emetics during the chill, opiates during the fever and Peruvian bark with "metalic tonics" during the apyrexia.

Polypharmacy was at its height at this time. The recognized fact that cinchona was a specific in malaria did not deter practitioners from mixing this medicine with other drugs. Opium and mercury were the most commonly used adjuvants to the bark, although alum, iron, antimony, cayenne pepper, chamomile, and a host of others were prescribed.

Much discussion took place regarding the use of mercury. Sydenham remarked that "to add anything to the bark argues either ignorance or craft."[3] It is perfectly obvious, however, from his writings that he did not practice what he preached, or he must have admitted himself a sinner in one or the other respect. He did not consider a preliminary mercurial purge to be always necessary for the action of cinchona. Stork, Pringle and Senac strongly advised that the viscera be well emptied by mercury in order that the humours might not be pent up by the astringency of the bark. Saunders, on the other hand, deplored any delay in the giving of cinchona, claiming that in the intermittent fevers of "low and marchy situations," "the use of either emetics or purgatives, as preparatory, is not only unnecessary, but in some cases productive of greater debility, and therefore to be avoided."[4] Of all the drugs used in the seventeenth century none was more abused than mercury. It was natural that the

purgative powers of calomel should have been used to rid the body of humours, but we are horrified at the enormous doses so often carried to the extent of bloody evacuations and salivation to the satisfaction of the prescriber.

The ancient therapeutic measure of bleeding was still practised on a large scale. Torti was the first to object to this procedure in intermittents, but he admitted that under certain conditions it was advisable. Every other writer of the eighteenth century gave indications for venæsection in fevers, agreeing that it was of the utmost value when the blood drawn off was "fizy."

Two notable substitutes for the bark were brought forward during this period. Renaud and Homberg in France found galls of great service in agues, and explained the benefit derived as due to the astringent properties which cinchona also possessed. The Academy ordered Lemery, Geoffroy and other members to make a trial of this drug, and their report was that galls did cure intermittents, though not so constantly as the Peruvian bark.[14] The other substitute was arsenic. In 1786 Fowler introduced his "mineral solution,"—now known by the author's name as "Fowler's Solution,"—as a cure for agues and periodic headaches. He cites no less than 247 cases treated by him in private and hospital practice, giving tables of the results. His conclusion was that this medicine was as efficacious as the bark when given in 12-drop doses two or three times a day. A contemporary condemns the use of this substance with the remark that "it cannot be deemed to be a proper remedy for an intermittent fever, whilst an intermittent fever is less formidable than arsenic."[3] This same author does not object to the use of mercury to the point of salivation.

Cardinal de Lugo was the first to call attention to the danger of adulteration of Peruvian bark suggested by the great and sudden demand for it throughout Europe.* The first bark brought over was the red bark from the trunk of the cinchona tree. Later, however, the quill bark from the branches was introduced with success, but owing to the increased demand it was adulterated, after which it naturally became less efficacious. As we

*Epistola Juan Cardinalis de Lugo al Signor Sebastiano Bado. Rome, October 4, 1659. Incorporated in the first chapter of the Anastasis Corticis Peruviæ of Badus.1a

have already seen, Harvey maintained that the differences in the bark sold on the market accounted for many of the failures by physicians to cure agues. It seems that the red bark went out of fashion, and during the period that the quill bark took its place there was considerable dissatisfaction. Finally, William Saunders brought to the attention of the profession in England the fact that the red bark was that used by Sydenham, Morton and the other early pioneers who claimed such good results from it, and that in his own practice and hospital cases he had found the red bark efficacious in agues where the common bark sold on the market had been used previously in vain.[4] Corrected in this matter of pharmaceutics, cinchona again gained favor among the physicians and we hear little more criticism of its value in malaria.

REFERENCES

1a. Badus, Sebastian. Anastasis Corticis Peruviæ, seu Chinæ Chinæ defensio. Genoa 1663, pp. 16, 22, 23, 24, 202.
b. **Idem.** Cortex Peruviæ Redivious, Genua. 1656, p. 35.

2. Markham, Sir Clements R. A Memoir of the Lady Ana de Osorio, Countess of Chinchon. London, 1874, p. 40.

3. Baker, Sir George. Observations on the late intermittent fevers; to which which is added a short history of the Peruvian Bark. Transactions of the College of Physicians, London, 1785. Vol. III, p. 173, 216 **et al.**

4. Saunders, William. Observations on the Superior Efficacy of the Red Peruvian Bark, in the Cure of Fevers. London, 1783, pp. 10, 32, 42, 57 and 99.

5. Sydenham, Thomas. The whole works of, 5th Ed. from the original Latin by J. Pechey. London, 1712, pp. 36, 37, 233.

6. Morton, Richard. Pyretologia, seu Exercitationes de Morbis Universalibus Acutis. London, 1692.

7. Hirschel, Bernhard—Geschichte der Medicin. Wien. 1862. p. 243.

8. Harvey, Gideon. The Conclave of Physicians, London. 1686. Pt. I. p. 138. Pt. II, pp. 124, 126, 135, 136.

9. Torti, Francisci, Therapeutice Specialis. Mutinæ, 1712.

10. Werlhof, Paul Gottlieb. Observations de Febribus præcipue intermittentibus. Venice, 1764.

11. Stork, Joan. Melch. Pyretos Hemitritaios Celsi et Galeni Cortice Peruviano Curatus, in Fasciculus primus Operum minorum Medicorum et Dissertationum. Vindobonæ, 1775, p. 251.

12. Pringle, John. Observations on the Diseases of the Army. London, 1765, pp. 99, 713-199.

13. Alibert, J. L.: A Treatise on Malignant Intermittents. 3rd Ed. Trans. from the French by C. Caldwell. Phil. 1807. pp. 236, 241, 249 and 250.

14. Cullen, William: Lectures on the Materia Medica. London, 1773. Vol. III, pp. 287 and 290.

15. **Ibid:** First Lines of the Practice of Physic. 3rd Ed. Edinburgh, 1781. Vol. 1, p. 67.

16. Fowler, Thomas: Medical Reports of the Effects of Arsenic in the Cure of Agues, Remitting Fevers, and Periodic Headaches. London, 1786.

CONCERNING ARSENOBENZOL.

FROM THE PHARMACEUTICAL LABORATORY, TOURO INFIRMARY.

By Dr. J. P. LOBENHOFFER, New Orleans.

The therapeutic results of the 606th combination in Ehrlich's series of organic arsenic compounds, named by him Salvarsan, have been so striking that it has become an almost indispensable factor in the armamentarium of the modern physician. Unfortunately, the European war has cut us entirely off from the source of supply of the original article, but several substitutes have lately been offered to take its place. Two of them are at present available in this country, one made in Philadelphia, known as Arsenobenzol, and the other made in Canada and marketed under the name of Diarsenol.

As the chemical composition of salvarsan has been well known from the time of its discovery, it should not prove a very difficult task to the chemist supplied with the necessary manufacturing facilities, which, by the way, are quite elaborate and expensive, to give us a product of the same chemical composition, and therefore with the same therapeutic properties. While owing to the short time elapsed since the introduction of the substitutes the writer is not in a position to express any opinion as to the therapeutic value, the manufacturers seem to have succeeded to make their products resemble salvarsan rather closely in appearance and physical and chemical properties.

Salvarsan, or arsenobenzol, or diarsenol, or, to give the child its full name, arsenic dihydroxydiaminodibenzol hydrochlorate is a bright yellow powder, more or less soluble in hot distilled water, with a strongly acid reaction. The average dose of six decigrams contains the equivalent of about four grains of arsenous acid ($As_2 O_3$). This amount, which, of course, would prove very quickly fatal in its inorganic form, is quite easily borne in organic combination, and right here lies the principal source of danger in the administration of all organic arsenic medication. It must be so handled as to prevent by all means the reduction of organic to inorganic arsenic.

Extensive experience in the preparation of arsenobenzol for intravenous administration in the laboratory of Touro Infirmary, where several thousand injections have been prepared, has shown that a modification of the method first suggested by Weintraut,

of Wiesbaden, is by far the best and safest way. The principal difference of this method as compared with the one generally employed, consists in the use of a one-fifth normal solution of sodium hydroxide in place of the 15% one generally used. It is perhaps superfluous to state here that the generally accepted way of preparing arsenobenzol for intravenous use is to dissolve the substance in freshly distilled hot water, and then add 15% solution NaHO, drop by drop, until a clear solution is obtained. A comparison of the amount of NaHO contained in the two solutions shows that one drop of the 15% solution represents more NaHO than 1 c. c. of 1/5 nomal solution.

Soon after beginning to prepare salvarsan for intravenous use we found that over-alkaline solutions, that is, solutions in which more alkali was used than was necessary to just get a clear solution, were much less stable and much more apt to upset the patient than solutions which were correctly made, i. e., just mildly alkaline. And then arose the question, how to tell what was the right amount of alkali. A few drops and even one drop over of the 15% solution made a big difference in the reaction. This and other considerations led us to experiment with the Weintraut method, and then we found to our astonishment that considerably less alkali, as much as 33%, was needed to get a clear solution, when we used the 1/5 normal solution, suggesting the formation of a mono-sodium salt with the 1/5 normal solution, instead of the disodium salt formed when the 15% solution is used. The physical characteristics of the two solutions also bore this theory out, the former producing a much lighter solution, which remains unchanged for twenty-four hours, if excluded from the air, while the latter makes a darker solution, which shows signs of decomposing within two hours.

The use of a normal solution pointed, of course, also to a determination of the acidity of the powder used, and here we were again surprised to find a distinct variation in different batches, amounting at times to as high as 10%, although they came from the same source of supply. This led us to work out the following method, for the preparation of arsenobenzol for intravenous use, which we have since followed in a long series of cases with very satisfactory results:

Dissolve the average dose of 0.6 of arsenobenzol in 30 c. c. of hot freshly distilled water. Now take 1 c. c. of this solution,

which represents 1/30 of 600 milligrams or 20 milligrams, and add enough distilled water to measure 10 c. c. Add one or two drops of phenolphthalein test solution and then enough 1/10 normal solution of sodium hydroxide to get a permanent pink color. The amount of 1/10 normal NaHO shows the acidity of the 20 milligrams of arsenobenzol. Multiplying this with 29 gives the quantity of 1/10 normal NaHO to neutralize the remaining 580 milligrams. To get the amount of 1/5 normal needed we divide this by 2, of course. To make the solution mildly alkaline, we add 2 more c. c. of the 1/5 normal solution than is necessary to neutralize, and this gives us the total quantity of 1/5 normal NaHO needed.

To illustrate: We find on testing with phenolphthalein that 1 c. c. containing the 20 milligrams of the drug requires 1.1 c. c. of 1/10 normal NaHO to neutralize it. On multiplying this with 29 we get 1.1x29=31.9, or practically 32 c. c., of 1/10 normal NaHO to neutralize the remaining 580 milligrams. Dividing this by 2 we get 1/2 of 32 or 16 c. c. of 1/5 normal NaHO, with 2 c. c. to make the solution alkaline, or a total of 18 c. c. This quantity is added at once to the acid solution, when on shaking up a clear light golden yellow solution results.

In other respects we follow the original method recommended by Ehrlich; that is, we put about 100 c. c. of warm sterile normal saline solution in a sterile glass stoppered cylinder of about 200 c. c. capacity, and strain the acid solution into this through sterile cotton, washing funnel and cotton with freshly distilled sterile water until no more color remains. Next the previously determined amount of 1/5 normal NaHO, which must be also sterile, of course, is added, the cylinder well shaken and enough sterile water is added to make the whole measure about 200 c. c.

This method ought to appeal to the medical profession in that it is much more accurate and definite than the rather crude way of adding a strong solution of sodium hydroxide until a clear liquid is effected. Any pharmacy with a fairly well-appointed prescription department can supply a correctly titrated normal solution of sodium hydroxide within half an hour. It is a very easy matter to dilute this to 1/10 and 1/5 normal. To avoid any change in strength by evaporation, it is best to sterilize them in an autoclave. The apparatus needed for this method is quite simple and inexpensive, consisting of a few graduated cylinders,

a small burette and a few beakers, and can be purchased for less than five dollars. Expert chemical knowledge is not needed to carry out this simple procedure, and it requires very little more time than the usual method. It seems to us that in dealing with a substance, the average dose of which contains enough arsenous acid to prove fatal to several men, any additional safeguard ought to be welcomed.

In conclusion, we would like to state that with solutions prepared in the above described manner, reaction is very rarely seen, provided the patient has been properly prepared by purgation and fasting. When it does occur, it is generally seen in secondary cases, where the sudden destruction of large numbers of spirochetæ in the general circulation sets free endotoxins which give rise to the clinical picture of chills, fever, headache, some nausea, etc., often called arsenobenzol reaction, but only indirectly caused by this drug. The direct symptoms of arsenical poisoning are gastro-intestinal irritation, renal inactivity, prostration and shock.

THE GENERAL STATUS OF IMMUNITY FROM A LABORATORY AND CLINICAL STANDPOINT.*

By ALEXANDER M. ROVIN, Ph. D., Detroit, Michigan.

History of medicine records the rise and struggle of one school after another, each vigorously contending for the truth of its particular theory, while denouncing and denying that of others Notwithstanding this, each school has contributed some nugget of truth which has helped to build up our modern science of medicine.

From these early times, medical practice has become more and more rational and definite and theories have given place to practical results worked out and checked up by clinical and laboratory tests.

As a result of this evolution of scientific research extending over many years, we have the new development known as Bacterin Therapy.

Unlike so many of its predecessors, this therapy is not the result of theories and polemics, but the outcome of well-ordered and developed facts worked out through experimental and clin-

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ical data. It comes to us free from the haziness and indefiniteness of unstable theories, without taint of prejudice or fierce dogmatism.

Founded upon animal experiments, checked up by delicate chemical and physiological tests, it makes no demand upon credulity, but offers data based on facts. It controverts no theory of any school, but harmonizes with the truth discovered by all.

The old school finds it acceptable—for how can it deny its own offspring? It meets the demand that, in therapeutics, the essential thing is the removal of the cause and the cure of disease by creating in the patient ferments which neutralize and destroy bacterial ferments producing the disease. This is what is termed immunity.

Immunity may be natural or acquired. Natural immunity may be explained on the theory that the nonspecific proteolytic ferments contained in the blood serum of one species will digest and destroy germs that may be able to live and cause disease in some other species. Acquired immunity may be active or passive. An active immunity may be obtained by the tissue cells becoming sensitized for the production of specific proteolytic ferments as a result of an infection or from germ inoculations. A passive immunity may be brought about by injecting or supplying immune serum obtained from some immunized animal, as is being so successfully done in the treatment of diphtheria or tetanus with antidiphtheritic and antitetanic serum. In this instance, the animal from which the serum was obtained produced the antibody; whereas in an active immunity the tissue cells of the person becoming immunized produce the antibody.

That germs are the cause of disease has been conclusively demonstrated by animal experimentation The use of animals for this purpose is of distinct advantage because no factor of a psychic nature enters into the process, and, by killing various animals at certain intervals the different stages of the diseased process may be carefully studied. To prove that a given germ causes a disease, it is necessary to always find that germ in that disease; grow it in pure culture, on artificial media, such as gelatin, and when inoculated into a susceptible animal produce the same disease and again find the germ in the inoculated animal and grow it in pure culture.

Germs grow and multiply by absorbing, digesting, and assimilating food substances with which they come in contact. When such food substances are not suitable for absorption, germs often secrete a ferment from their surface which will dissolve the food with which they come in contact to prepare it for absorption. They also secrete ferments within the germ cell which serve the purpose of building the food substance into the cell structure.

It has been known for a long time that, in many diseases, recovery from one attack renders the individual immune to subsequent attacks. With animal inoculations it is also found that when an animal recovers from a live germ inoculation, subsequent inoculations of the same germ will, as a rule, not cause an infection. Furthermore, inoculations of killed germs in proper sized doses at certain intervals for a brief period of time will also render the animal immune to live germ inoculations of the same kind.

Fresh normal blood when placed in an incubator will destroy a limited amount of a great variety of germs. If a greater amount of germs is added than the blood can destroy it is found that the number of germs is greatly diminished during the first few hours of incubation, and after that the remaining live germs will begin to multiply and grow freely in the blood. Blood from an animal that has been previously immunized will also destroy a limited amount of a great variety of germs, but will destroy a much greater number of the kind of germs to which the animal has been immunized. These experiments show that normal blood contains a limited amount of substance that has a destructive influence on germs which is consumed during this germ-destroying process, after which remaining germs may grow freely, and that this germ-destroying property of the blood is enormously increased to the particular germ to which the animal has been immunized. Some of these immunizing substances have been definitely determined and are known as lysins, agglutinins, precipitins, opsonins, etc., from the particular way they influence the germ, and by clever means, ways for determining the amount of these immunizing substances present in the blood have been devised.

All this clearly points out that recovery from infectious diseases is due to the development of immunizing substances or antibodies, as they are frequently called, by the defensive

mechanism of tissue cells in their efforts in overcoming an infection.

Vaughan, Friedberger, Abderhalden and others, through extensive animal experimentation, point out that these germ-destroying substances which are developed during the immunizing process are ferments which are evolved by the tissue cells as a result of the germ invasion From this conception the various immunizing substances known as agglutinins, precipitins, opsonins, lysins, etc., would be regarded as different forms of ferments. So, when an infection takes place, living single cell microorganisms gain possession, live, grow and multiply in the fluids, or tissues of the body. To live and grow these germs must utilize substances from the living body as food. Where such substances are not suitable for absorption and assimilation, the germ secretes extra-cellular or intra-cellular ferments to prepare or digest these substances so that the germ may continue to live. Tissue cells, on the other hand, in their defenses of overcoming the invading microorganism, also possess the power of evolving ferments which in this instance have a destructive or digestive influence on the germs present in the tissues. From this it is seen that the battle between the invading microorganisms and the tissues of the body is one in which the life activities of the germs through their capacity to feed on and digest living substances is met by the capacity of the tissue cells in producing ferments that have a destructive or digestive influence on the germs. Where tissue cells have been trained to develop these ferments, where they have in a measure acquired this capacity to produce the special ferment necessary to destroy a particular kind of germ, the battle becomes a comparatively easy one. Such an individual is said to be immune to the germ; his tissue cells have become sensitized to this variety of germs. If the tissue cells have had no training in fighting a certain kind of germ and the invading microorganism happens to be virulent, the chances are that the germ will gain the upper hand and destroy life.

From this it should be clear that the main factor in preventing germ invasions or the development of infectious diseases, consists in having our tissue cells efficiently trained in destroying or digesting disease germs with which we are liable to come in contact. That virulent live germs causing infectious diseases are not suitable agents to adequately train tissue cells in this defensive

ferment production is demonstrated by the fact that they often cause prolonged illness or destroy life. Recovery from a severe infection does not develop a greater degree, or a more intense immunity, than what takes place by overcoming a less virulent germ of the same variety. This shows that adequate immunization does not depend on the virulence of the microorganism which was overcome. Recovery from infections by some microorganisms does not necessarily establish a permanent immunity; the immunity that was established during the course of the disease wearing off in course of time, when the individual may again be subject to the same infection.

An infection constitutes a condition in which a living bacterial protein is maintaining itself in the tissues of the animal body In an actve infection, tissue sensitization for the production of specific proteolytic ferments, which have a destructive influence on the invading organisms, is evidently not taking place adequately, and this must be due to some inherent power possessed by the living bacterium, which hinders tissue cells in antibody production. To destroy these germs, antibodies must be produced. Those who are theoretically opposed to vaccin therapy contend that the live organism in the infected area is the best suited antigen to stimulate tissue cells towards antibody production, that if living organisms will not irritate or agitate tissue cells towards developing a protest with antibody production, why should killed organism injections hasten immunization? It seems never to have occurred to opponents of vaccin therapy that live organisms may irritate tissue cells to a point where their immunizing response is crippled or retarded, instead of being stimulated. That the live organism in its effort to grow and multiply has such a devitalizing influence, is evident from the fact that its destruction is usually a prolonged process and in many instances gains supremacy and destroys life.

It has been found that in immunizing animals a more intense degree of immunity can be developed if live virulent organisms are injected after a fair degree of immunity has been established from killed organism inoculations. This has led some to believe that this same high degree of immunity will develop from live organisms in a virulent infection. This does not necessarily follow, because the animal that has been previously immunized with killed organisms has enough antibody in its blood to cripple the

activities of the virulent live organism, subsequently injected, to sufficiently prevent its gaining possession, and consequently does not hold the same relation to living tissues that the organism in an active infection does.

Recently it has been found that tissue cells can be efficiently trained for specific ferment production to digest certain kinds of germs by repeated inoculations of killed germs. This is a distinct step in advance to the art of artificial immunization. By killing the germs all dangers of causing an infection are avoided, and by gauging the dose and properly spacing the intervals between inoculations it is possible to have the case under control. When killed germs are injected under the skin, tissue cells with which they come in contact deal with them as intruders and, having the biochemical composition of invading germs, they are dealt with in the same way as if a focus of infection had developed. Tissue cells become sensitized for the purpose of producing specific ferments to destroy, digest the killed germs that have been injected. The germs being killed, they can offer no resistance to destruction; can secrete no ferments that have a devitalizing influence on the tissue cells with which they come in contact, consequently, the entire cell energy can be devoted to specific ferment production for germ destruction. When the cells have become sensitized for specific ferment production, as a means of protection, they continue to produce ferments for some time and by repeating inoculations at proper intervals a high state of immunity can be developed. This is the method of immunization that is being so successfully employed in preventing typhoid fever in the various armies in the world as well as in civil communities where typhoid fever has put in an appearance. Three doses of killed typhoid bacilli or typhoid vaccin, or bacterin, as it is preferably called, given at ten-day intervals, is sufficient to protect a person from contracting the disease The treatment is perfectly harmless and causes but little disturbance. The same method of immunization is also being successfully employed in preventing whooping cough, scarlet fever, cerebrospinal meningitis, typhus, bubonic plague, cholera, colds, pneumonia, and other diseases. All this clearly shows that bacterin injections offer an efficient means of training, teaching, or developing tissue cells as specific ferment producers, so as to make it possible to resist invasions of live virulent organisms of the same

kind that were present in the bacterin that was employed for immunizing purposes; in other words, tissue cells can be more readily trained as germ destroyers by having them operate on killed germs, than when they are brought unprepared under the devitalizing influence of virulent live germs. Virulent live germs retard or inhibit immunization by their devitalizing influence on tissue cell activities, while killed organisms or bacterins stimulate the immunizing mechanism for antibody production.

The amount of killed germs that it is necessary to inoculate to activate tissue cells for specific ferment or antibody production is surprisingly small. The dead germs contained in an average dose of a bacterin would weigh less than four ten-thousandths (0.0004) part of a grain—an amount so small that no poisonous effect could possibly follow its injection. From the fact that such small doses are employed it may be inferred that the biochemical composition of the germ substance is very toxic in character. Animal inoculations show that this is not the case. Repeated inoculations of guinea pigs with doses of killed germs of what would be equal to five to ten thousand times the dose usually given to man showed no ill effect on the animals. A bacterial vaccin or a killed germ inoculation produces in no sense a drug action. Killed germ inoculations simply arouse a protest on the part of the tissue cells expressed in specific ferment production, and experience shows that a very small amount of killed germs is necessary for this purpose.

From what has been said it should not be inferred that immunization can accomplish everything. Where abscesses develop they should be opened; where deformities exist they, where possible, should be corrected. In short bacterins do not displace other useful measures of any kind, whether of a surgical nature, or the use of antiseptics or drugs; but where an infection exists, bacterins may be used alone or in conjunction with other measures to an enormous advantage to the patient

Most diseases are due to infectious organisms gaining entrance and maintaining themselves in the tissues or fluids of the living body.

To overcome an infection, the defensive forces of the body must be trained or developed in antibody production for the destruction of the invading germs and thus establish an immunity.

Live virulent germs retard immunization and on account of

their destructive influence on tissue cells often inhibit immunization and destroy life.

Killed germs when injected into healthy tissue rapidly stimulate the defensive mechanism, train and develop tissue cells for antibody production and by this means prevent and cure disease.

The reason bacterins are not more generally employed is because the principle that killed organisms are better agents to train tissue cells for antibody production than the live organisms present in the infected area is not sufficiently realized nor, as yet, thoroughly understood by the general practitioner. Many indefinite conceptions prevail which obscure the causative relation between the infecting germ invasion and the activities of the tissue cells in their effort to destroy the germs causing the disease and thus restore health. It is only by studying its practical application, the means of testing its accuracy, that theoretic knowledge is made useful. That vaccin therapy is in accord with the theoretic knowledge of prophylaxis and immunization can no longer be disputed, for its therapeutic value is established by tangible clinical observation and laboratory data.

A WORD ABOUT PITUITRIN.*

By H. R. COGBURN, M. D., Bayou La Batre, Ala.

The purpose of presenting this paper for your consideration and discussion is to give, if possible, a clear, concise and unbiased opinion of pituitrin or pituitary extract and its proper application in the management of obstetrical cases based entirely on my limited personal experiences covering a period of about twenty months.

Pituitrin is an extract of the posterior or infundibular portion of the pituitary gland. This gland has heretofore been an enigma to the anatomist. Of course, there have been various theories advanced from time to time concerning its physiological existence. Suffice here to say it is located at the base of the brain and consists of two lobes, a large anterior and a small posterior lobe or infundibular portion. From a physiological standpoint the pituitary gland is largely speculative But there seems to be beyond all doubt a substance or substances contained in the gland

*Read before Washington County, Alabama, Medical Society, April 6, 1916.

that exert considerable influence over the metabolism and on the cardio-vascular system. The physiological action of the two lobes is quite different. It is claimed that animals survive the removal of the posterior lobe, while, on the other hand, death occurs from the removal of the anterior.

It has been found that pituitrin increases blood pressure and diminishes pulse rate, this depending entirely upon the dose given and to the susceptibility of the patient.

Pituitrin acts very similarly to adrenalin on the blood vessels, except that the former elevates the blood pressure for a much longer period of time. It is contra-indicated in cases already exhibiting an increase of blood pressure. Especially is this true in nephritis and the cardiac complications of goiter.

The results of pituitrin when administered with discretion is almost to a degree marvelous, but to produce these results it must be employed at the correct time and under proper conditions. To administer pituitrin at the onset of labor is not only useless so far as hastening the expulsion of the fetus, but is actually a dangerous procedure. It is also contra-indicated in the following conditions: contracted pelvis, tumors or any obstruction in the natural passage through the soft parts. It should not be given where there is a contracted rigid os, transverse or other abnormal presentations.

Although pituitrin is said to be contra-indicated in nephritis, I have employed it more than once in nephritic subjects, in which case I felt justified in taking the risk, and in each instance satisfactory results were obtained.

I never give pituitrin until the cervix is almost, or completely, dilated. If the second stage of labor has not really begun, I first ascertain whether or not the cervix is soft and dilatable. When the pains in the second stage of labor grow weak, the fetus at a standstill and the mother exhausted after a long, hard first stage, the passage clear, I feel free to use pituitrin The pains will be greatly and rapidly increased, even the mother notes the progress. From this stage of labor I use it with discretion until the head is born.

Pituitrin should not come in contact with alcohol, as it renders it inert. If you sterilize your hypodermic syringe and needle with alcohol, you should always use sterile water afterwards. The syringe and needle should be free from all traces of alcohol.

Boiling is the best plan to sterilize the syringe and needle. I administer, as an initial dose of pituitrin, 1 c. c., just as soon as the os is well dilated; if satisfactory results are not obtained, I repeat it in from one half to one hour.

Pituitrin does not induce labor pains. Its function should be to assist and strengthen natural pains or to induce pains after inertia. We read of men who have administered pituitrin, it being clearly indicated, yet they received no results. Do not condemn this product because you fail to procure results in 100% of your cases. There is no specific known to medical science commanding such a brilliant record. I am sure when administered judiciously pituitrin will produce the desired results in a great majority of cases I have terminated labors which without its use would have unquestionably necessitated the application of forceps, which would be frequently obviated if pituitrin was employed. DeLee says that a conservative estimate would place the number of deaths occurring annually from the direct and indirect consequences of labor at 20,000.

Lacerations, malpositions, congestive conditions of the genital organs all produce postpartum results that add to the discomfort, unhappiness and distress of a large number of women who have undergone maternity. Any therapeutic agent which will serve to lessen the mortality or the debilitating effects of child birth should be welcomed to the obstetrician. Think of the numerous and serious conditions often produced by the application of instruments, both to the mother and child, and note how these conditions can be obviated, or at least very much lessened by the conservative use of pituitrin.

As an ecbolic this agent has a place in normal labor. By normal labor I do not mean those rapid cases where there are always natural pains and a quick delivery, but those slow, long-drawn-out cases which are considered normal with some women. I do not wish to make the impression that I would endeavor to deliver a woman with undue haste, not allowing sufficient time for the soft parts to prepare themselves for the passage of the fetus. On the contrary, I would much prefer the long labors rather than attend a precipitated one in which there is so much danger of lacerations. Yet there are cases that require hours of waiting, where the pains are good but the intervals between the pains are long. The patient is worn out and disgusted, but after much

delay the child is finally born. In such cases the administration of pituitrin would greatly shorten the suffering and anxiety of the patient, to say nothing of the probable benefit to the child.

In presenting the following cases, will state that I did not select them especially for this report, but merely chose them at random.

Case 1.—Patient white. Second child, first child delivered with forceps, placenta delivered with placental forceps, severe hemorrhage. Patient had 2 or 3 sharp pains about 8 a. m. followed by dull aching for about one hour, after which all pains ceased. Patient walked about house all day. Had slight backache same evening. I was called again about 10 o'clock p. m. On vaginal examination found cervix almost completely dilated. No pains. Gave various medicines to induce same, also manipulated cervix with my hand. All efforts failed. Patient ceased having pains that night and next day. In the meantime I wired for some pituitrin. It arrived about night and I read the instructions and decided to give it a trial. When I next examined the patient I found the cervix unchanged. Head presenting, roomy pelvis. Gave 1 cc. pituitrin hypodermically. In about 15 minutes violent pains were started and continued as in ordinary labor; progress was satisfactory and as head pressed against the perineum I gave a few whiffs of chloroform. Child was born in a little more than an hour after the pituitrin was given; placenta was easily delivered, flow normal. No after pains, splendid contraction of uterus. Mother and child progressed nicely.

Case 2.—Negro woman. Age 25, fourth labor. Labor began about 10 p. m. Midwife was called and effected delivery about 3 a. m. It was discovered that uterus was still very large and proved to be twin pregnancy. Pains ceased, flow moderate. I reached patient at 8 a. m., found cervix very much dilated, no pains. Tips of fingers of right hand protruding from vulva. After some difficulty hand was reduced. Head was soon felt presenting. Gave 1 cc. pituitrin; in one and one-half hour second child was born, placenta delivered, uterus contracted. Mother and children in good condition.

Case 3.—White woman. Age 31, first labor. Was called to patient after she had been in labor for about 12 hours in charge of midwife. On examination I found the os rigid and contracted and the fetus dead. Gave large doses of chloral hydrate, after which the os softened. Pains were still regular and fairly strong. Dilated cervix with my fingers. Head presented, pelvis large. Progress very slow. Gave 1 cc. pituitrin. Pains increased in strength and frequency in 5 minutes. In one hour head was pressing slightly against perineum, pains getting weak again and woman worn out. I then gave the second cc. of pituitrin. Pains increased in strength,

in 30 minutes a large badly decomposed fetus was expelled. The pulse increased in frequency for about one hour after delivery. Patient made a rapid recovery without complications.

Case 4.—White woman, age 23, first labor. Patient attended for about 20 hours by midwife before I was called. On examination I found the cervix fairly well dilated. Head presenting. Strong pains growing weaker, and at longer intervals. Patient very much exhausted. Pelvis slightly contracted and a large head made a forceps operation undesirable. Gave patient chloral and a small amount of chloroform by inhalation. Rest and sleep followed for 3 hours after which patient awoke very much refreshed. Pains returned but were rather weak, by manipulating the cervix pains were made stronger, progress slow—gave 1 cc. pituitrin, pains strengthened and progress better. After one hour I have the second cc. of pituitrin, cervix now completely dilated, pains good, but progress slow. Patient was again becoming very much exhausted. Thirty minutes after the second dose I gave the third dose of pituitrin. The child was born in 20 minutes in good condition. Patient experienced no laceration, the placenta was slightly attached but was finally delivered by Crede's method. No hemorrhage, good contraction. Mother's pulse was very rapid for several hours after delivery. Mother made a normal recovery.

Various conclusions have been reached regarding the therapeutic value and technic employed in the administration of pituirin. By referring to current literature on this subject it will be noted that various results have been effected. One physician writes: "I have received very gratifying results from pituitrin prescribed in pregnancy for the purpose of expressing flatus and fecal matter from the intestines. Pituitrin has proven to be of great value for its diuretic effect and for elevating the blood pressure." Personally I have employed this product to increase uterine contractions only. I have received satisfactory and gratifying results in each and every case where given.

Nothing, with the exception of chloroform and antisepsis, has been discovered for obstetric practice that has proved to be so great and useful as pituitrin, since the invention of forceps.

In conclusion, allow me to state that in my opinion in conservative hands this is a safe and valuable remedy in obstetric practice.

TWO CASES OF BONE GRAFTS.*

By JAS. T. NIX, JR., B. Sc., M. D., New Orleans, La.

Under the heading of Bone Grafts, I have had two cases which might be of interest.

Case No. 1: George Schrimpf, 21 years old, of Bogalusa, La. Family history and previous history unimportant. Present illness, April 4, 1915, patient in alighting from freight engine, slipped on a piece of coal, which threw him against boiler in rear of engine. As he stumbled, the siphon pipe struck him in the spine of back at level of lower border of scapula. Patient was immediately rendered unconscious and was taken to the Bogalusa hospital. On regaining consciousness he noticed a painful enlargement over vertebral column at spine of ninth dorsal, and from this point down to extremities there was decreased sensation and greatly impaired motion. Radiating, lancinating pains over lower thorax and upper abdomen were always present, intensified by the erect or reclining position and making decubitus imperative for comfort.

He was first seen by me on May 11, 1915, at which time all of the above conditions were present in exaggerated form.

Diagnosis: Radiograph showed a compression fracture of body of ninth dorsal vertebra; physical signs and clinical symptoms elicited compression of the cord.

Treatment: A graft six inches long was taken from anterior border of right tibia and firmly sutured in a gutter formed by splitting longitudinally the spines and connecting ligaments of the seventh, eighth, ninth, ten and eleventh dorsal vertebræ Patient supported with plaster jacket for eight weeks.

Result: At the end of three months patient had entirely recovered and resumed work without inconvenience.

Case No. 2: Mrs. B. D., Charity Hospital, 35 years old.

Present illness: During the past year patient has suffered incessantly with dull lumbar pains, which, despite medical treatment have progressively grown worse. Numerous lupoid eruptions were on face and body of patient.

Diagnosis: Skiagraph and clinical measures showed tubercular spondylitis of first and second lumbar vertebræ.

Treatment: Bone graft from tibia to vertebral column, including spinous processes of the eleventh and twelfth dorsal, first, second, third, and fourtth lumbar vertebræ.

Result: At the present time firm anchylosis has replaced the disease and a cure has, in this wise, been effected.

Case No. 1 was operated on at Hotel Dieu, May 14, 1915.

Case No. 2 was operated on at the Charity Hospital, September 16, 1915.

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REGULATION OF CHIROPODY.

The Louisiana State Chiropodists' Association proposes to seek legislation at the coming State Legislature aimed at regulating the practise of this calling in the State of Louisiana. Such legislation has obtained in other states, and it has deserved consideration because the chiropodists have made no pretense to any other practise than that covered by their title and, moreover, as in other states, the regulation is to be by examination and licensure, placed under the administration of the regular State Board of Medical Examiners. The proposed bill contemplates the definition of the practise of chiropody, the registration of persons at present engaged in such practise, the examination of future prac-

titioners, the determination of the scope of the examination, the penalties attached to irregulars, and the cancellation of registration for cause, the particular occasions for which are set forth in the bill.

There should be no objection to such a bill on the part of medical men, if the chiropodists want such protection of their organized practise. The usefulness of the chiropodist and the necessity for such a particular occupation may be debatable, for the treatment of the conditions falling within the field of the chiropodist is in itself worthy of more consideration than is usually given. So long as the physician continues to exclude such minor ailments from his dignified practise, the public will continue to demand the convenient skill of the chiropodist for the amelioration of the social evils of the feet, and it is highly commendable that the body of such operators should desire to dignify their work by a reasonable legislative act.

NEW JOURNALS.

More than casual interest attaches to the appearance of the *Journal of Cancer Research* and of the *Journal of Immunology*, two publications emanating in joint issue from the presses of Williams & Wilkins Co., in Baltimore, and the Cambridge University Press, in London.

Each journal has a distinguished list of collaborators, most of whom rank high in scientific medicine.

The *Journal of Cancer Research* is certain to make its field of value to all medical men, for the interest in cancer from every point of view is general and the lack of exact knowledge will create a desire for current information relating to this problem. The initial number argues that this journal will meet this demand, for it contains articles of research in the laboratory, statistical investigations, and detailed reports of the Proceedings of the American Association for Cancer Research. The format of the publication is exceptionally academic, offered really as a group of essays, with perfect letter press and excellent illustrations. The absence of any extraneous departments is noteworthy.

This publication is to appear quarterly and the editorial direction will be in charge of Dr. Richard Weil, of New York.

No less attractive is the first number of the *Journal of Immun-*

ology, under the editorial charge of Dr. Arthur F. Cola, of New York, and appearing as the official organ of the Society of Serology and Hematology and of the American Association of Immunologists.

This publication is issued as a companion to the cancer journal and with the same method of editing, the material naturally covering its specific field. Anaphylaxis, complement fixation in varicella and variola, etc., are types of subjects discussed—all with the characteristics determining their suitability for the character of journal here noticed.

The American Society of Bacteriologists has also announced the publication of its *Journal of Bacteriology* with the purpose of presenting the broad aspects of the subject as it may relate to medical problems, but as well in its association with general economic and educational questions.

So, with these additions to the periodicals devoted to scientific medicine, we should be richer in our educational opportunities and every measure of success should accrue to the promoters of these enterprises, requiring, at this time, considerable courage in the undertaking. The multiplication of journals is not at all desirable, but when new publications can find fields of special usefulness, they should meet with the fullest encouragement.

ANESTHETICS AND TRAINED NURSES.

The communication we published last month on the above subject, accompanied by an opinion from the attorney of the Board of Medical Examiners, evidently has had the effect desired by the Secretary of the Board. The intention was to attract the attention of the profession to an important point in order to prevent an unintentional violation of the law and to bring about an amendment of the law if deemed best.

We understand that the Board also has received a number of communications on the question and, in order to bring out the points at issue, we print first a letter from Dr. Bethea, and a second letter from the Board's attorney sent to another physician making similar inquiries, which can serve as an answer to all.

New Orleans, April 4, 1916.

Drs. Chassaignac and Dyer,
Editors New Orleans Medical and Surgical Journal.

Gentlemen: In your issue of April, 1916, page 670, under the head of "Communication" you have a letter from Dr. Leckert, also

one from his counsel, Mr. Florance. Your publication gave this matter wide circulation and while I do not approve of nurses administering anesthetics I believe that all parties concerned are due a further investigation and presentation of facts.

If the legal proposition hinges on the phrase "Applying of a Drug for the Relief of Bodily Pain," then what would be the difference in giving ether by inhalation for anesthesia, ether by mouth for abdominal pain, morphine by hypodermic, or applying a mustard poultice for bronchitis?

It would seem that there would have to be some further legal specification in order to call it a misdemeanor for a nurse to administer an anesthetic duly prescribed by an authorized authority, else we would have to conclude that every dose of a prescription for the relief of pain would have to be personally administered by the physician.

Hoping for further information, I am

Yours very truly,

O. W. BETHEA, M. D.

New Orleans, April 4, 1916.

My dear Doctor:

I acknowledge receipt of your letter in regard to the opinion given by me to the Secretary of the State Board of Medical Examiners as to whether the administration of an anesthetic comes within the definition of the practice of medicine under the Medical Examiners' Law of this State.

You ask me to let you know why this law has never prevented the doing of certain things detailed by you. My answer is, "I do not know." My duty as counsel of the Board is limited to giving to the Board my opinion on concrete questions of law submitted to me. I have nothing to do with the policy of the Board, and still less is it my duty to suggest to the Board the manner in which, or the extent to which, the law should be enforced. Had the questions detailed by you been submitted to me, my answer would have been exactly the same as given in the opinion referred to by you.

The Medical Law of this State, before it was enacted, was passed upon by the Committee of the State Medical Society in charge of legislation affecting the practice of medicine in Louisiana. While it is very possible that the question at issue did not present tself to that Committee, nevertheless, that Committee approved the exceedingly inclusive definition of medicine that the statute contains.

You will appreciate the fact that as the law stands, it would be impossible for me to differentiate a service of the kind mentioned by you done under the supervision of a physician, from one done without the supervision of a physician; this, for the reason that no such difference is provided for in the statute. Still less does the statute define what constitutes supervision; whether it is limited to the personal presence of the physician, or whether it includes also instructions to be carried out in the absence of physicians.

You must also remember that there is nothing in the statute referring to Trained Nurses; the law creating the status of "Registered Nurse" merely gives a title which can be used only by those coming within the provisions of that law. The "Registered Nurse Statute" gives no greater privileges to registered nurses over unregistered nurses, beyond the use of the title, or its abbreviation, R. N.

You will se therefore that if my interpretation is not correct, there is nothing to prevent any physician from authorizing any untrained person to administer out of the presence of the physician and under circumstances where the condition of a patient may have changed, an anesthetic, a hypodermic injection, or the giving of any other drug. If the medical profession desires to have inexperienced persons use such drugs under the instructions but in the absence of physicians, it should be so definitely stated and legislation can be had to that end.

If the profession desires to limit the administering of such drugs to "Trained Nurses," the legislation should be explicit to that end.

You will realize that when a law is passed, it cannot be held to apply only to disreputable people who violate it; like the rain "it falls on good and bad alike."

I have yet to receive any suggestion as to how, within the limits of the law, the administering of these drugs by others than physicians should be permitted.

Either the law allows **any** person under the instructions of a physician, present or absent, to administer drugs, or it does not. Where the law makes no distinction between classes of persons (other than physicians), I cannot advise that such classes should be created by the Board of Medical Examiners.

If I were to have any opinion on the subject that opinion would be, that a provision permitting the administering of an anesthetic, or other drug, in the presence and under the personal supervision of a physician, should be enacted as a part of the Registered Nurses' Law of the State, provided trained nurses are specially trained to render such service and are examined as to their competency.

As to whether any person other than a trained nurse should be permitted to administer drugs is another question, which the State Medical Society is much more competent to answer than I am.

I may state that the Legislature of Louisiana will meet next month and that I have received no instructions from the Board of Medical Examiners looking to an immediate and stringent enforcement of the law in regard to the matters inquired of.

This will give ample time to at least the Parish Medical Society, if not to the State Medical Society, to express its opinion as to how far, and in what cases, and by what class of persons, other than physicians, the administering of drugs should be permitted. This being determined definitely, I would advise that an amendment be sought to the Registered Nurse Stafute, or that an independent

statute be sought to be enacted covering the recommendations of the provision.

Accept my assurance that it will give me pleasure to assist in obtaining legislation recommended by the medical profession.

With personal regards, believe me

Yours very truly,

(Signed) ERNEST T. FLORANCE,

Attorney Louisiana State Board of Medical Examiners.

Mr. Florance's suggestion that the local society, and especially the State Society, give the matter its attention is an excellent one.

We would deprecate any attempt to tinker with the "practice of medicine" act. If any change in legislation be deemed necessary in order to legalize the administration of anesthetics by nurses, which seems to be quite a growing practice and one which is quite prevalent in other centers, it should be done in connection with the "Registered Nurse," act as advised by Mr. Florance, and only after mature deliberation, including that of proper restrictions.

Society Proceedings

MINUTES OF FIRST SEMI-ANNUAL MEETING OF FOURTH DISTRICT MEDICAL SOCIETY OF FOURTH CONGRESSIONAL DISTRICT OF LOUISIANA.

The first regular semi-annual meeting of Fourth District Medical Society was called to order at the Hotel Youree, Shreveport, at 2 p. m., March 23, 1916, by President C. H. Irion; Secretary A. A. Herold at his desk.

The invocation was delivered by Rev. W. F. O'Kelly, of Shreveport. This was followed by addresses of welcome on behalf of the city of Shreveport by Dr. S. A. Dickson, Mayor, and on behalf of the local medical fraternity by Dr. R. M. Penick, president of Shreveport Medical Society. In words of appreciation these welcomes were responded to by President Irion.

The minutes of the organization meeting of February 15 were read and adopted.

The scientific program being then in order, Dr. C. C. Allums, of Ringgold, read a paper on "Diagnosis and Treatment

of Empyema;" discussed by Drs. Willis, Crain, Penick, Sanderson, Bodenheimer, Ragan, Picard, Abramson and by the essayist, in closing.

Dr. H. J. Parsons, of Mansfield, read a paper on "Surgical Vomiting, With Report of Four Cases of Intestinal Obstruction;" discussed by Drs. Callaway, Knighton, Crain and by the essayist, in closing.

Dr. A. P. Crain, of Shreveport, read a paper on "The Problem of Peritonitis;" discussed by Drs. Hunt, Willis, Callaway, Sanderson, Furman, Ragan, Nelson, Knighton and by the essayist, in closing.

Dr. C. E. Edgerton, on "Malarial Hematuria and Hemaglobinuria," came next; discussion of this paper participated in by Drs. Tucker, Scales, Parsons, Hendrick, Silbernagel, Sanderson, Crow, Herold, Hunter, Hamner, Irion and Edgerton.

Dr. E. J. Frater, of Shreveport, then read his article on "Electrical Treatment of Neuritis;" discussed by Drs. Barrow, Knighton and Frater, in closing.

The secretary then made report as to evening session and banquet and also told of work of the council; he also gave a financial report, showing $62 dues paid to date, with total expenses amounting to $24.77. He then suggested that Dr. Dowling be permitted to address the meeting.

Upon invitation of President Irion, Dr. Dowling then took the floor and made a talk on patent medicines, misleading advertisements and vital statistics, which was listened to attentively and duly appreciated.

Meeting then adjourned till 7:30 p. m.

At 7:50 the evening session began with Dr. A. B. Moise's paper on "Osteoma of Frontal Sinus;" discussed by Dr. J. L. Scales.

Dr. S. Y. Alexander read a paper by himself and Dr. Rougon on "Pyelitis;" discussed by Drs. Huckaby, Picard, Walke, Sutherlin and Alexander, in closing.

Dr. C. P. Munday read a paper on "Dietetic Management of Acute Digestive Disturbances in Children;" discussed by Drs. Picard, Knighton and Crain.

It was then unanimously decided that next semi-annual

meeting be held in Shreveport, the exact time to be left to the Council.

The meeting then adjourned to the dining room, where a banquet was tendered by Shreveport Medical Society.

(Signed) A. A. HEROLD, *Secretary.*

Medical News Items

SOCIETY PROCEEDINGS.—The East Feliciana Parish Medical Society met on April 5, 1916, and had as its guest Dr. John Smyth, of New Orleans, who read an interesting paper on "Appendicitis." A discussion on clinical cases followed. A dinner at the List Hotel closed the meeting.

ALIENISTS AND NEUROLOGISTS TO MEET.—The fifth annual meeting of the Alienists and Neurologists of the United States will meet, under the auspices of the Chicago Medical Society, June 19-24, at the La Salle Hotel. For further information, address Dr. W. T. Mefford, Secretary of Conference, 2159 Madison Street, Chicago, Ill.

SOUTH TEXAS MEDICAL SOCIETY MEETING.—At the 39th semi-annual meeting of the South Texas Medical Society, New Orleans and Tulane University were well represented on the program, Drs. S. M. D. Clark, Carroll W. Allen, E. Denegre Martin, J. T. Halsey, Allan C. Eustis and Isadore Dyer, contributing papers or addresses. Dr. J. Goldberger, of the Public Health Service, expounded his pellagra diet theory in extenso. The rank and file of the South Texas practitioners were not yet persuaded that diet is the sole factor in the cause, prevention and cure of pellagra, as Dr. Goldberger so enthusiastically believes.

The meeting was well attended, under the presidency of Dr. E. A. Malsch, of Victoria. The October meeting will be held at Orange, Texas.

EXAMINATION OF CANDIDATES FOR ASSISTANT SURGEON.—The United States Public Health Service announces an examination of candidates, at Washington, D. C., May 31, 1916, for admission to the grade of Assistant Surgeon in the Public Health Service. The candidate must be between 23 and 32 years of age, a graduate of a reputable medical college, and must furnish testimonials from two responsible persons as to professional and

moral character, together with a recent photograph of himself. Candidates must have had one year's hospital experience or two year's professional work. The salary is $2,000 a year and the tenure of office is permanent. For information and invitation to appear before the board of examiners, address Surgeon General, Public Health Service, Washington, D. C.

Association of Medical Officers of the Army and Navy of the Confederate States will hold its twenty-sixth annual meeting at the Tutwiler Hotel, Birmingham, Alabama, May 16, 17 and 18. Invitations are extended to all members, and to those who are eligible to membership, to be present at the meeting. For full information, address Samuel E. Lewis, M. D., Secretary-Treasurer, 1418 Fourteenth Street, N. W., Washington, D. C.

The American Proctologic Society will hold its eighteenth annual meeting in Detroit, Michigan, June 12 and 13, 1916, at the Hotel Statler. A preliminary program has been published which gives promise of material of much interest to the profession. A cordial invitation is extended to the profession to attend the meeting.

Meeting of the American Society of Tropical Medicine. —The thirteenth annual meeting of the American Society of Tropical Medicine will be held in Washington, in the Library of the Hygienic Laboratory, May 9, 10 and 11, 1916, with headquarters at the New Willard Hotel. Dr. Milton J. Rosenau, of Boston, the president, will address the Society on "The Prevention of Tropical Diseases." Among the contributors to the program we note the names of Drs. Joseph D. Weis, C. C. Bass, W. H. Seeman, Ralph Hopkins, J. B. Elliott, Jr., and Sidney K. Simon, of New Orleans.

New Orleans Dispensary for Women and Children.— After closing its doors for much needed repairs, the hospital recently reopened with only ten beds. Donations from various sources were received which will enable the hospital to reorganize on its former footing. During the past month 930 patients were treated. Two new physicians were added to the staff, Dr. J. J. Delambre, visiting physician in diseases of children, and Dr. J. R. D'Aunoy for the medical clinic and as pathologist for the hospital.

ORANGE PEEL FOR INTESTINAL STASIS.—According to the claims of a French journal, exhausted orange peel is being used in the French army for chronic constipation. The peel is boiled for an hour. The liquid is used for preparing flavoring mixtures and the refuse is dried and given freely. Not only does the peel seem to stimulate the action of the intestinal canal, but it stimulates the flow of the bile as well. With the discovery of garlic for healing the wounds of soldiers, and orange peel to cure the ill which is responsible for so many of the diseases of humanity, the future indeed looks bright and there should be no cause for pessimism.

ABUSE OF CHARITY.—It was recently discovered at Bellevue Hospital that a patient was getting the benefits of that institution at the expense of the taxpayer when he was worth $15,000 or more. This discovery has led to an investigation by Dr. C. J. Whalen, of Chicago, who states that each practicing physician in that city is deprived of no less than $2,500 a year in possible fees by the senseless manner in which uncalled for charity is dispensed. It is estimated that the maintenance of the Bellevue and allied hospitals costs the taxpayer nearly $2,000,000 a year.

PROPER DIET FOR YOUNG CHILDREN.—The United States Department of Agriculture has just issued a bulletin containing recipes and direction for mothers on the question of proper food for young children. Clean whole milk, at least a quart a day, is the basis of diet for a child three to six years old, plus bread and other cereals, butter and other fats, vegetables and fruits and "simple sweets." This bulletin may be had by addressing the Department, Washington, D. C.

AWFUL CONDITIONS IN DETROIT SLUMS.—The health department of the city of Detroit recently found almost incredible conditions in the slums of that city. One hundred men and six women were found living in a three-story structure. In a small room with one window, sealed, were found seven beds occupied by fifteen men, one of whom as a young man in the final stages of tuberculosis. The owners of the place were prosecuted.

MOVIE THEATERS AND VENTILATION.—Out of 518 moving picture theaters in three boroughs of New York City recently tested for ventilation by inspectors of the health department, only 77 were reported perfectly ventilated. Unless a satisfactory excuse can be given by the owners of the defective places for

existing conditions, it is stated that action will be taken against them.

THE SAMUEL D. GROSS PRIZE.—This prize is awarded every five years to the writer of the best original essay, not exceeding 150 printed pages, octavo in length, on some subject in surgical practice, founded upon original investigations, the candidates for the prize to be American citizens. The receiver of the prize shall publish his essay in book form and shall donate one copy of the work to the Samuel D. Gross Library of the Philadelphia Academy of Surgery. The essays must be written singly, in the English language, and must be sent to the Trustees of the Samuel D. Gross Prize of the Philadelphia Academy of Surgery, care of the College of Physicians, 19 S. 22nd Street, Philadelphia, on or before January 1, 1920.

OKLAHOMA INDIANS AND TRACHOMA.—Trachoma is said to have a terrible hold upon the Indians in Oklahoma, more so than in any State in the Union. According to a recent government survey, 88 per cent of the pupils enrolled in one Indian school in that State were afflicted with this disease, while 68.72 per cent of all Indian residents on the reservations in Oklahoma have trachoma.

WARM WATER BEDS IN CAMBRIDGE HOSPITAL.—The latest feature of the famous military hospital at Cambridge, England, is a ward in which patients sleep on inflated rubber mattresses half submerged in tubs filled with warm water. The water, at a temperature of 100 degrees, is kept flowing through the tub. It is said that patients suffering intensely from wounds received on the battle field are relieved from pain whilst in the water and do not feel anything worse than the usual discomfort from long confinement in bed.

APPROPRIATIONS BY THE ROCKEFELLER FOUNDATION.—Appropriations amounting to $1,200,000 for various branches of its activities were recently made by the Rockefeller Foundation. These cover the work of the department recently established at Princeton, N. Y., the study of animal diseases, the Union Medical College in Pekin, China, the aiding of the hospital work of Alexis Carrel in France, and of the prison camps of Europe.

RELIEF FUND FOR THE BELGIAN PROFESSION.—The report of the treasurer, Dr. F. F. Simpson, of the committee of American physicians for the aid of the Belgian profession, shows, for the

month ending April 8, 1916, a total disbursement of $7,310.04, and a balance on hand of $631.82. Total receipts previously reported are $7,941.86. No contributions since February 5, 1916.

Coeducation in Medicine.—According to report, the trustees of Columbia University have decided to admit women to the College of Physicians and Surgeons. Columbia is the third large medical school which has recently opened its doors to women students, the School of Medicine of the University of Pennsylvania and the School of Medicine of the Tulane University of Louisiana being the other two. At the present time sixty-three medical colleges in this country admit both sexes.

Pellagra Research Wins Prize.—The Academy of Sciences in Roumania has bestowed the Adamachi prize on Drs. A. Babes and V. Busila, of Bucharest, for their comprehensive report on pellagra in Roumania.

Lunacy in London Decreases.—The London county council's return for 1915 records a striking decrease in the number of lunatics chargeable to London. The decrease affects both male and female, and the cause appears to be due to a great decrease of poverty, the strain of which is one of the causes of insanity. The reduction of poverty is due to the abundance of employment furnished by war work and the withdrawal of a large part of the male population from civil work to the army. The fact of this striking decrease of lunacy is contrary to the prophecy of some of the scientists of this country and of Europe, that there would be a very large increase in the occurrence of lunacy, under war-time conditions.

Students' Enrolllment Limited.—The board of trustees of the University of Pennsylvania has recently adopted a resolution limiting the classes for the first and second years in the School of Medicine to 100 students each. There are now five schools which limit the enrollment of their classes, the other four being Johns Hopkins University, Medical Department; Leland Stanford University, School of Medicine; Rush Medical College, and the University of Minnesota Medical School.

Pediculosis Quarantines Immigrants.—Due to the presence of pediculosis, ninety-one immigrants who arrived in New York City on the *Patris* from the Piraeus, Greece, March 21, were placed under quarantine at Hoffman Island.

MEASLES CLOSES SCHOOLS AND BARS PICTURE SHOWS.—The Board of Health of Sunbury, Pa., recently ordered public schools closed and all children under 16 years of age to stay away from picture shows and all places of public amusement because of a serious epidemic of measles. There were 117 cases reported.

SHELL-MAKING BREAKS WOMEN'S HEALTH.—According to rumor, which occasionally breaks through rigid censorship of affairs in the belligerent countries, young girls are collapsing under the strain put upon them in shell factories. Women and young girls are compelled to work continuously from Friday morning until Saturday noon, with only a slight break for a hurried lunch. A serious problem is confronting the statesmen of these countries as to how they can best conserve the health of the women.

PARENTS CO-OPERATE WITH HEALTH AUTHORITIES.—As an instance of what may be accomplished when parents co-operate, the Commissioner of Health of New York State cites the fact that in a small town in the State 37 cases of whooping-cough have been reported within three months by families not employing physicians. The parents of Buffalo are therefore compelled by the commissioner to also report communicable diseases within their homes if a physician is not in attendance.

PERSONALS.—Drs. Carroll Kendrick, Charles A. Everett, W. F. Stroud, W. J. Redditt and V. Milton Perry, of Mississippi, are members of the State Legislature.

Dr. Jos. A. O'Hara, coroner for the city of New Orleans, has been made chief of the Neurological Department of the Presbyterian Hospital Annex.

REMOVALS.—Dr. C. B. Alexander, from Alhambra, to Downey, Cal.

Dr. R. F. Harrell, from Alexandria, to the First National Bank Building, Shreveport, La. Dr. Harrell has associated with him Dr. I. H. Smith, of New York.

DIED.—On March 16, 1916, Dr. J. N. Ball, of Bogalusa, La., formerly of Tylertown, Miss.

On March 16, 1916, Dr. A. Guilbeau, of Breaux Bridge, La., aged 60 years.

On January 15, 1916, Dr. L. A. Scott, of Kingston, La.

Book Reviews and Notices

Surgical Operations with Local Anesthesia, by Arthur E. Hertzler, M. D. Second edition. Surgery Publishing Company. New York, 1916.

The second edition of Hertzler's "Surgical Operations Under Local Anesthesia" greatly enlarges the scope of his first edition and proves a valuable contribution to this interesting and important field of work. Some of the advice and general remarks in the opening chapters is particularly good, and the writer of this criticism thoroughly agrees with his conclusions regarding the combined use of local and general anesthesia. The discussion of the use and action of quinin is particularly full and thorough and many valuable suggestions are offered for its use. These become particularly interesting when it is remembered that Dr. Hertzler is probably the foremost investigator of this agent, and has, no doubt, had greater experience with its use than most other operators who have gradually drifted away from it fearing its necrotic effects; while these occur, Dr. Herztler admits, when due to faulty technic, he seems to prefer it to other agents or uses it in sequence. Some helpful suggestions are given for the combination of quinin and novocain. On the whole there is at times a rather too free use of quinin, but upon this there may exist a difference of opinion.

While the technic in places is incomplete and a few errors and omissions have unavoidably crept in, the field has been unusually well covered for a volume of its size. The credit of first utilizing the orbital route for reaching the foramen rotundum has been erroneously given to Payr (**Arch. f. Klin. Chir.** 1903 LXXII, 284) while its origin is American, as it was first demonstrated and successfully used by Matas (Loc. & Reg. Anesthesia. La. State Medical Society, 1900).

The appearance of several volumes upon this subject during the last few years speaks for the interest that this field of work has attracted, and is an indication of the gradual dissemination of its principles and practice among the rank and file of the profession, where its use is most needed and where its benefits to physician and patient alike will be most apparent. Many fundamental principles upon which the local anesthetic practices of to-day are established were first worked out by American pioneers; Cornjng, Halsted, Crile, Matas, Cushing and others, but the American physicians were slow to appreciate its advantages and it first became more popular abroad under the leadership of Schleich, Reclus, Tuffier, Bier, Braun, Barker and their followers.

We are glad to recognize that it has now found its place in America and assign to this volume of Hertzler's a conspicuous and prominent place in the library of the American physician.

CARROLL W. ALLEN.

Urgent Surgery, by Felix Lejars. Translated into English from the Seventh French Edition by Mr. William S. Dickie and Dr. Ernest Ward. Vol. II, William Wood and Co., New York.

This is the second volume of this well known work, now in its seventh edition. It gives a very adequate discussion of emergency surgery; the descriptions are very clear and the translation has been rendered in a clear and most agreeable style. We can cordially commend the work to those desiring a reliable guide in emergency. PARHAM.

Bone Graft Surgery, by Fred H. Albee, A. B., M .D., F. A. C. S., with 332 Illustrations, three of them in colors. W. B. Saunders & Co. Philadelphia and London, 1915.

The book tells in a very interesting and convincing manner the wide use of the bone graft in orthopedic surgery.

The table of contents gives a good idea of the scope of the book: I. The Fundamental Principles Underlying the Use of the Bone Graft in Surgery; II. Author's Electric Motor Operating Outfit and Technique of Usage; III. The Bone Graft in the Treatment of Pott's Disease and other lesions of the Spine; IV. The Inlay Bone Graft in the Operative Treatment of Fractures; V. Operative Methods for Remodelling or Ankylosing the Hip Joint; VI. The Inlay Bone Graft for Fixation of Tuberculous Knee-Joints; Infantile Paralysis; Osteoarthropathy (Charcot's Disease); The Wedge Graft for Habitual Dislocation of the Patella; VII. The Bone Graft in the Treatment of Diseases and Deformities of the Foot and Leg; VIII. Miscellaneous Surgical Uses of the Bone Graft.

It is hard for those of us who are doing bone surgery to feel as enthusiastic as the author or to agree with him fully as to the results obtained by the use of these procedures.

The method has undoubtedly done a great deal to help bone surgery, especially the use of the graft for Pott's disease of the spine where an autogenous graft is inserted into the split spinous processes of the vertebræ.

The author feels that bone plates and metallic nails favor nonunion, and that their use should be discouraged.

The book marks a distinct advance in this work.

EDWARD S. HATCH.

Laboratory Methods. By B. G. R. Williams, M. D., and E. G. C. Williams, M. D., with an introduction by Victor C. Vaughan, M. D., LL. D. Third edition. C. V. Mosby Company, St. Louis.

The book is written for the physician who wants to do his own laboratory diagnostic work. Doctors are learning and good teachers are teaching that a very modest amount of equipment and a knowledge of technic not difficult to master are all that are required for one to do almost all of the laboratory diagnoses required in everyday practice. This book is intended to present the necessary instructions for such work. C. C. BASS.

Infection and Immunity. Charles E. Simon, B. A., M. D. Third edition, revised and enlarged. Lea & Febiger, Philadelphia.

The appearance of this third edition speaks for at least two things: one, the growing appreciation of the great importance of immunology and serology; and the other the recognition of the authority and ability of the author. So much new and very useful matter is included in this edition that those who have former editions are almost obliged to get this one too. Modern medicine requires a knowledge of the fundamental principles of infection and immunity. This book will be found most useful to physicians and students alike in acquiring such knowledge. BASS.

Diseases of Infants and Children, by Henry Dwight Chapin, A. M., M. D. and Godfrey Roger Pisek, M. D., Sc. D. Third revised edition. William Wood and Company, New York.

Drs. Chapin and Pisek have given to the profession in the presentation of this book a work compact in its general make-up, yet consistent with thoroughness and completeness in the subjects concerning diseases of infants and children.

The classification of diseases and conditions under very definite headings should appeal especially to those who want quick references and at the same time desirous of obtaining details in as condensed form as possible.

The diagramatic tables of measurements are very practical and are arranged in a manner easily remembered. While again, the topographical plates are plain, clean cut and very serviceable.

The chapter on Special Examinations is gone into quite extensively and includes all the latest and most practical tests, their technic and explanations.

Of particular interest is the chapter on Practical Feeding. Here the authors not only explain in commonplace English the details of artificial feeding, but they also insert interesting and simple diagrams illustrating the various steps in making up milk formulas.

Telling one how to make up a formula and actually preparing it are two very different things. We often lose sight of the fact that when dealing with young mothers, who are being confronted with new experiences, the details of which they have never once considered, or perhape even heard of, it is of the utmost importance for us to be extremely plain and simple in our detailed explanations. The authors have therefore very wisely illustrated their article in a manner easily understood and which should make plain the important principles in practical feeding to be taught to the laity.

We would recommend this work to the profession and to the student as a safe guide in the principles of pediatrics.

DANDRIDGE P. WEST.

Diseases of the Skin, by Henry H. Hazen, A. B., M. D. C. V. Mosby Company, St. Louis, 1915.

The chapter on Diagnosis shows the author's first departure from the usual methods of texts on skin diseases; there are other departures in the book. The selective idea of diagnosis is excellent and if expanded would be of even more service to the student of the subject. The chapters on Therapeutics and Hygiene are both tantalizing because of their brevity, but the subject matter is easily worth while.

The arrangement of the material relating to particular diseases is quite original, as the author groups the diseases under unusual headings as "Congenital Affections of the Skin," "Diseases Due to Local Irritation," "Diseases Probably Due to External Infections," "Diseases Due to Systemic Infections With Unknown Organisms," etc. The method is interesting and the author's manner of disposing of each group is also interesting, but the originality certainly removes the work from all possibilities as a text book, no matter how useful it may be as a reference. It is certainly an evidence of individual courage for Dr. Hazen to have so liberally dispensed with the moral traditions of classification; the justification of his method might be debated.

The book is replete with excellent illustrations and the descriptive text is generally clear and succinct. Particular attention has been given to the pathology, which adds to the merit of the book.

Altogether the author has contributed to dermatology an interesting and extended presentation of his views and methods and in a manner which bears the stamp of his individuality.

DYER.

A Text-Book of Physiology: For Medical Students and Physicians. By William H. Howell, Ph. D., M. D. Sixth Edition, thoroughly revised. W. B. Saunders Company, Philadelphia and London, 1915.

The clearness of presentation of the ground work of physiology makes this book an excellent text for medical students. Credit should be given to the author for the careful references to the recent physiological literature which the reader will find at the bottom of each page.

That part of the book dealing with nervous physiology is up to the standard of the previous editions. The physiology of the circulation and respiration is very complete and the student will find his time well spent in studying these difficult subjects as they are taken up and considered by the author.

The internal secretion theories, which are at present accepted, are carefully given; the physiology of the organs of reproduction is too briefly handled and has not received the revision given the subject of the ductless glands.

Whenever necessary the author has gone briefly into the relationship between physiological chemistry and physiology; and at the end of the book one finds the first section of the appendix devoted to the proteins and their classifications. The second section consists of a discussion of diffusion and osmosis.

F. P. CHILLINGWORTH.

Treatise on Fractures, by John B. Roberts, A. M., M. D., F. A. C. S., and Joseph A. Kelly, A. M., M. D. J. B. Lippincott Company. Philadelphia and London, 1916.

There are certain features which single this work out from the mass of books on the subject.

The style is clear, the statements are plain and concise and are apparently based on large personal experience and the treatment adopted in most instances is based on anatomical facts. The space given to anatomical considerations such as the action of muscles in the production of deformity, with illustrative drawings and the consideration of the time of ossification of the epiphyseal lines are particularly valuable at this time when there is need for better results from conservative methods of treatment of fractures.

The chapter devoted to each fracture is complete in every detail, and the method of paragraphing used by the authors should make the book one of easy and ready reference.

It is impossible in a short review to note the good points specially; on the whole it is the best work on fractures we have seen.

ISIDORE COHN.

Publications Received

W. B. SAUNDERS COMPANY. Philadelphia and London, 1916.

The Medical Clinics of Chicago. March, 1916, Volume 1, Number 5.

The Endemic Diseases of the Southern States, by William H. Deaderick, M. D., and Loyd Thompson, M. D.

LEA & FEBIGER. New York and Philadelphia, 1916.

Progressive Medicine, edited by Hobart Amory Hare, M. D., assisted by Leighton F. Appleman, M. D. March 1, 1916.

The Principles and Practice of Perimetry, by Luther C. Peter, A. M., M. D., F. A. C. S.

Pulmonary Tuberculosis, by Maurice Fishberg, M. D.

J. B. LIPPINCOTT COMPANY. Philadelphia and London, 1916.

The International Clinics. Volume 1. Twenty-sixth Series, 1916.

The Basis of Symptoms, by Dr. Rudolph Krehl. Authorized translation from the seventh German edition by Arthur Frederick Beifeld, Ph. B., M. D., with an introduction by A. W. Hewlett, M. D. Third American edition.

Treatise on Fractures, by John B. Roberts, A. M., M. D., F. A. C. S., and Jos. A. Kelly, A. M., M. D.

P. BLAKISTON'S SON & CO. Philadelphia, 1916.

The Practitioner's Medical Dictionary, by George M. Gould, A. M., M. D. Third edition, revised and enlarged, by R. J. E. Scott, M. A., B. C. L., M. D.

RICHARD G. BADGER. Boston, 1916.

Nervous Children, by Beverly R. Tucker, M. D.

Manual of Vital Function Testing Methods and Their Interpretation, by Wilfred M. Barton, M. D.

A. L. CHATTERTON CO. New York, 1916.

A Treatise on Medical Practice, by Otto Juettner, A. M., Sc .M., Ph. D., M. D.

WASHINGTON GOVERNMENT PRINTING OFFICE. Washington, D. C., 1916.

Public Health Reports. Volume 31, Numbers 9, 10, 11, 12 and 13.

United States Naval Medical Bulletin. April, 1916.

Reports of the Department of Health of the Panama Canal for the Months of December, 1915, and January, 1916.

Report of the Department of Health of the Panama Canal for the Year 1915.

Annual Report of the Surgeon General of the Public Health Service of the United States. For the Fiscal Year 1914.

United States Public Health Service Exhibit. At the Panama-Pacific International Exposition, San Francisco, 1915. By W. C. Rucker and C. C. Pierce.

The Navy League Unmasked; The World Wide War Trust. Remarks of Hon. Clyde H. Tavenner, of Illinois, in the House of Representatives. February 15, 1915.

MISCELLANEOUS:

Annual Report of the Library Committee of the College of Physicians of Philadelphia. For the year 1915.

Annual Report of the United Fruit Company Medical Department. 1915. Press of Geo. H. Ellis Co., Boston, 1916.

Transactions of the American Surgical Association. Volume 23. Edited by John F. Binnie, M. D. (William J. Dornan, Philadelphia, 1915).

The Johns Hopkins Hospital Reports. Volume XVII. (The Johns Hopkins Press, 1916).

Reprints

The Advantages and Risks of Combined Local and General Anaesthesia, by W. H. B. Aikins.

The Pineal Gland in Relation to Somatic, Sexual and Mental Development; The Pineal Gland, by Carey Pratt McCord, M. D.

Chronic Appendicitis Pylorospasm and Duodenal Ulcer; Aerophagy; The Roentgen Ray in Gastro-Intestinal Affections; An Improved Stomach Tube, by Charles D. Aaron, Sc. D., M. D.

The Child and the Community; The Responsibility of the State in the Tuberculosis Movement Artificial Pneumothorax, by Edward O. Otis, M. D.

Scientific Management in the Hospital; Hospital Efficiency from the Standpoint of the Efficiency Expert, by Frank B. Gilbreth.

Chronocyclegraph Motion Devices for Measuring Achievement; Motion Models; Motion Study and Time Study Instruments of Precision; Motion Study for Crippled Soldiers; What Scientilc Management Means to America's Industrial Position, by Frank B. Gilbreth and Lillian Moler Gilbreth, Ph. D.

Changes Needed in American Secondary Education, by Charles W. Eliot.

The Filterability of Bacillus Bronchisepticus: With an Argument for a Uniform Method of Filtration, by N. S. Ferry, Ph. B., M. D.

A Modern School, by Abraham Flexner.

MORTUARY REPORT OF NEW ORLEANS.

Computed from the Monthly Report of the Board of Health of the City of New Orleans for March, 1916.

Cause.	White	Colored	Total
Typhoid Fever	1	1	2
Intermittent Fever (Malarial Cachexia)	1	2	3
Smallpox	....	....	....
Measles	1	....	1
Scarlet Fever	....	....	....
Whooping Cough	1	....	1
Diphtheria and Croup	4	1	5
Influenza	11	6	17
Cholera Nostras	....	....	....
Pyemia and Septicemia	2	....	2
Tuberculosis	48	49	97
Syphilis	2	11	13
Cancer	23	5	28
Rheumatism and Gout	3	1	4
Diabetes	3	1	4
Alcoholism	....	....	....
Encephalitis and Meningitis	3	....	3
Locomotor Ataxia	....	....	....
Congestion, Hemorrhage and Softening of Brain	18	7	25
Paralysis	2	....	2
Convulsions of Infancy	....	2	2
Other Diseases of Infancy	7	3	10
Tetanus	1	2	3
Other Nervous Diseases	1	2	3
Heart Diseases	68	55	123
Bronchitis	....	....	....
Pneumonia and Broncho-Pneumonia	18	33	51
Other Respiratory Diseases	....	3	3
Ulcer of Stomach	....	1	1
Other Diseases of the Stomach	2	2	4
Diarrhea, Dysentery and Enteritis	10	4	14
Hernia, Intestinal Obstruction	3	1	4
Cirrhosis of Liver	6	4	10
Other Diseases of the Liver	4	....	4
Simple Peritonitis	....	....	....
Appendicitis	2	1	3
Bright's Disease	22	22	44
Other Genito-Urinary Diseases	13	11	24
Puerperal Diseases	3	1	4
Senile Debility	5	....	5
Suicide	6	....	6
Injuries	25	13	38
All Other Causes	28	18	46
Total	347	262	609

Still-born Children—White, 21; colored, 25. Total, 46.

Population of City (estimated)—White, 276,000; colored, 102,000. Total, 378,000.

Death Rate per 1000 per Annum for Month—White, 15.09; colored, 30.82. Total, 19.33. Non-residents excluded, 17.02.

METEOROLOGIC SUMMARY (U. S. Weather Bureau).

Mean atmospheric pressure 30.06

Mean temperature ..... 64.

Total precipitation ..... 0.64 inches

Prevailing direction of wind, southwest.